

THE
NAUTILUS.

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DEVOTED TO THE INTERESTS OF
CONCHOLOGISTS.

VOL. IX.

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No. 1

DESCRIPTIONS OF TWO NEW EOCENE SOLARIIDÆ FROM ALABAMA.

BY T. H. ALDRICH.

Solarium elaboratum Conrad vir *bimixta*. Plate I, figs. 1, 2, 3.

Shell elevated, peripheral margins minutely beaded, flattened, acute; umbilical rib very small and placed close to suture, umbilical carina prominent and beaded. Base very finely striated with a strong beaded rib close to the periphery. Spiral ornamentation approaching *Solarium cupola* Heilpr. Max. diam. 15 mm., alt. 7 mm.

Locality: Matthews' Landing beds near Rosebud, Wilcox Co., Ala.

This variety, while belonging to the *acutum-elaboratum* section, has a combination of characters approaching other sections. The drawings executed by Dr. McConnell, of Washington, show this form so beautifully it is scarcely necessary to describe it.

Prof. W. H. Dall, in *Trans. Wagner Free Inst. Science*, Vol. 3, part 2, p. 323, Dec. 1892, has divided the Eocene *Solariums* into four sections, and, by letter to me, has lately added a fifth, viz.: Section *DINAXIS* Dall. "Spire flattened, with the circumference of shell forming the periphery; the umbilicus wide, nearly funicular, with thread-like spiral ribbing or none, the umbilical carina simple or finely granular, forming the base of the shell." This new section includes *S. alabamense* Dall, and the following new species.

Solarium planiforme n. sp. pl. I, figs. 4, 5, 6.

Shell flat, whorls six, apical one smooth, the balance with a beaded spiral boundary followed closely by a smaller spiral likewise beaded, two faint spirals near suture; lines of growth fine, coarser nearer aperture, the side of the body-whorl forming an acute angle with the top and nearly a right angle with the base; the side is slightly convex, with a granular raised line immediately below the periphery and two fainter ones near the base; the basal keel beaded; umbilicus wide, marked with two or three beaded lines. Aperture wedge-shaped, narrower at junction with body-whorl. Max. diameter 19 mm., elevation 6 mm.

Locality: near Rosebud P. O., Wilcox Co., Ala., in Matthews' Landing beds.

A MONTH WITH THE MICHIGAN FISH COMMISSION.

BY BRYANT WALKER, DETROIT, MICH.

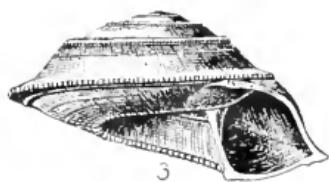
In 1893, the Michigan Fish Commission, in co-operation with the University of Michigan, inaugurated a systematic biological examination of the Great Lakes, with special reference to the work of the Commission in replenishing the rapidly decreasing fisheries of the State. The headquarters of the field-party for 1894 was established at Charlevoix, the well-known summer resort, on the east coast of Lake Michigan, and formerly a fishing station of considerable magnitude. Through the kindness of Prof. Henry B. Ward, the Director-in-charge, the writer was invited to spend his vacation with the party as conchologist. In addition to the usual methods of collecting along the shore and from small boats, considerable dredging was done in the deeper waters of both Lake Michigan and Pine Lake. A three days' trip to the Beaver Islands at the northern end of Lake Michigan, was one of the most interesting episodes of the summer, and one most fruitful in its results, as it was, undoubtedly, the first time the islands had been visited for scientific purposes. The unusual facilities enjoyed by the expedition in the line of deep water dredging, have afforded many noteworthy additions to the fauna of the State in all classes of the invertebrata and especially in the mollusca; and, at the suggestion of the editors of **THE NAUTILUS**, the following summary of the results obtained has



1



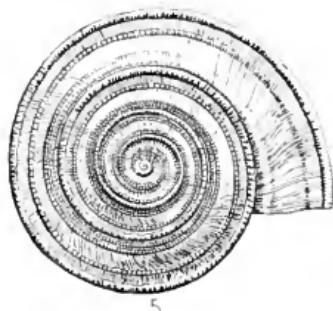
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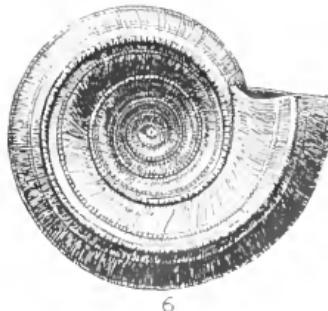
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6

ALDRICH—New Eocene Solariidæ.

been prepared in advance of the formal report of the summer's work.

Owing to the sandy nature of the soil, so characteristic of that portion of the State, and the long-continued drought which prevailed during last summer, terrestrial mollusks were not so numerous, either in species or individuals, as might naturally have been expected. The characteristic feature was the occurrence of many species, especially of the *Zonitidae*, peculiar to the northern region. Thus *Zonites ferreus* Mse., *binneyanus* Mse., and *exiguus* Stimp., *Vitrina limpida* Ged., and *Helix harpa* Say, are not found in the southern part of the State. *Patula asteriscus* Mse. and *Strobilops virgo* Pils., also northern forms, were interesting additions to our fauna. The local and rare (in this State) *Helix sayii* Binn., an essentially northern form, also occurred, indicating its probable range across the northern part of the State, as all the examples heretofore known to the writer have been from the counties bordering on Lake Huron. A few specimens of the albino variety of *Patula alternata* Say, were found associating with the typical form. Two forms of *Helix albolabris* Say were noted, occurring side by side, the one quite typical in shape and color, but rather below the average size and with a very thick and broadly-reflected lip; the other larger and much inflated, with a thin, dark purplish brown shell, having the narrowly reflected lip more or less deeply tinged with purple; a very beautiful form, not seen elsewhere. The only Pupa found was *P. contracta* Say, while *Vertigo* was represented by four forms, *V. ovata* Say, *bollesiana* Mse., *ventricosa elatior* Sterki, and *pentodon* Say. In addition to the universally-distributed *Succinea obliqua* Say and, *arava* Say, was found the elongated form of *S. ovalis* Gld., common in the northern part of the State, which has been doubtfully referred to the *S. higginsi* Bld. (see *NAUTILUS*, VII, p. 127). In all, thirty-one species of land-snails were found, of which two were new to the fauna of the State.

Among the fresh-water pulmonates, many interested forms occurred. The most noteworthy of them was a single example of a deep water form of *Limnaea stagnalis* L., dredged from ten metres depth in Lake Michigan, at High Island Harbor in the Beaver Islands. It is about 23 mm. in length, exceedingly fragile, of a pure translucent white, and, though somewhat larger and differently proportioned, appears to be analogous to the var. *Bottnica* of Clessin from Sweden. At the same locality occurred a small globose form

of the same genus which may be new. Also a small white *Physa* which is provisionally referred to *P. gyrina* Say. A small elongated *Limnaea* of the *reflexa* group from the same locality, seems to be the *L. lanceata* Gld. No less than seven different species of *Limnaeidae*, six of operculates, and many *Pisidia* were brought up by one haul of the trawl from this prolific locality. In a small lake near the south end of Beaver Island, which was simply swarming with animal life, were found the finest specimens of *Limnaea ampla* Migh. yet seen from Michigan. The largest example collected measured 28½ mm. in length and 19 mm. in breadth, the aperture being 19 ¾ mm. long and 13 mm. broad.

The *Limnaeidae* of Pine Lake, which empties into Lake Michigan at Charlevoix, were also extremely interesting. The bottom of the lake is composed almost wholly of marl, except where it has been covered by a thin coating of sand washed in from the shores, and, as a consequence, both plant and animal life exist under very unfavorable circumstances. The level of the lake seems to have been lowered by the canal made by the U. S. Government to connect it with Lake Michigan, and the former lake terrace is now largely exposed, and, in many places, quite dry. In the numerous pools, however, which are left along the shore, the *Limnaea catuscopium* Say is found in great abundance and almost infinite variety. It varies in shape from the comparatively slender form usually found in the Great Lakes to the globose form described as *L. pinguis* by Say, and seems, in many cases, to run very close to that of *L. ample* Migh. The Pine Lake examples have usually a very thick, solid opaque shell, and a large proportion are more or less distorted, the most common effect of their unfavorable environment being apparently to induce a very abrupt and rapid expansion of the outer lip, which, in most cases, is accompanied by a heavy callous deposit all round the aperture. The dredge also brought up from the marl of the bottom some other curiously distorted forms of *Limnaea*, whose specific position has not yet been satisfactorily determined. The curious *Planorbis multicoloris* Case also occurred here, rarely alive, but in great abundance among the dead shells along the shore. There is reason to suppose that these shells came largely from the marl deposits under the lake. It also seems probable that this species will prove to be only a form of *P. campanulatus* Say, peculiar to localities where the marl is found. At any rate, all the localities in this State, from which it is now known, are alike in this

respect, and specimens were found in places where the marl was less abundant, which seem to connect the two forms.

Along the Lake Michigan shore, among the stones, *Physa ancillaria* Say occurred, exhibiting a very heavy, solid, opaque shell. The same form is found plentifully at Mackinac Island, and seems to be one of the most characteristic forms of the region. A heavy malleated form of *Limnaea emarginata* Say is associated with it in both localities. *Limnaea desidiosa* Say and *Physa integra* Hald. were found plentifully in similar localities.

In one of the smaller inland lakes near Charlevoix, the dark red form of *Planorbis exscutus* Say, recently distinguished as var. *rubellus* by Sterki, was found. The typical form of the same species, as well as *P. bicarinatus* Say and *parens* Say, occurred abundantly in the deep-water dredging at High Island. The great similarity of the Limneid fauna of northern Michigan to that of Maine was again manifested in the discovery, in a small mill-pond near Charlevoix, of the ecarinate form of *P. bicarinatus* recently distinguished by Mr. Pilsbry as var. *aroostookensis*. The only species of *Aneylus* met with was the *A. parallelus* Hald., which was common among the lily-pads in all the smaller lakes. Among the operculates there was little of special interest. *Goniobasis livescens* Mke., as usual in the lake region, was abundant everywhere, and in Lake Michigan was found in thirty feet of water. *Valvata tricarinata* Say and *sincera* Say were also abundant in deep water, and the latter species from High Island was unusually large and fine, and might be referred to the form described as *V. striata* by Lewis. The *Campolomae* were also abundant. The slender northern form described by Lea as *C. milesii*, however, was found only in one lake on Beaver Island. The Lake Michigan form was *C. decisa* Say. The Amnicolae were exceedingly abundant, the two larger forms *A. limosa* Say and *lustrica* Pils. occurring everywhere. *A. grana* Say was found at High Island only, as was also a single specimen of *Bythinella obtusa* Lea. One of the few disappointments met with was the failure to find the deep water form, *A. sheldoni* Pils., originally found in the deep water of Lake Michigan, at Racine, Wis. The only novelty among the *Unionidae* was the occurrence of *Unio borealis* Gray, in a small lake on Beaver Island. This is another addition to our fauna, and, I believe, the most western locality yet cited for the species, which, as Mr. C. T. Simpson, to whom I am indebted for the identification, suggests, is apparently only a form of *Unio luteolus* Lam. The

Anodonta occurred with their usual abundance and perplexing variety so characteristic of the inland lakes of Michigan. Possibly, owing to the unprotected character of the shore near Charlevoix, but few were found in Lake Michigan. *A. footiana* Lea, however, was found at Fisherman's Island near Charlevoix and also at St. James' Harbor, Beaver Island, where *A. subcylindracea* Lea and *ferussaciuna* Lea also occurred. But it was among the *Corbiculidae* that the most interesting finds of the expedition were made. Both species and individuals were exceedingly abundant. Indeed, there can be no doubt that the smaller *Pisidia* form one of the most important portions of the food of the whitefish. The *Sphaeria* were most abundant in the inland waters where *S. simile* Say and *striatum* Lami. were found in profusion nearly everywhere. *S. rhomboideum* Say and the beautiful little *S. rosaceum* Pme. also occurred in one of the smaller lakes. A fine, new species, about the size of *S. occidentale* Pme. was dredged from 25 metres off Grand Traverse Bay. A larger form not yet satisfactorily determined was brought up from a lesser depth off the south end of Beaver Island. The *Pisidia* are now in the hands of Dr. V. Sterki, who has kindly consented to examine and determine them, so that the entire list cannot be yet given. But I am enabled to state that there are, at least, twelve species represented, of which seven are new to the State, including four species new to science. At High Island *Pisidia* were particularly abundant. A fine triangular form, as large as *P. virginicum* Bgt., proves to be the *P. idahoense* Roper. At the same place, Dr. Sterki's recently-described species, *P. punctatum*, also occurred. A most interesting find was that of a form which Dr. Sterki informs me cannot be distinguished from the *P. milium* Held., of Europe. This, I believe, is the first instance in which a species of this family has been proved to be an inhabitant of both continents. The other species found were *P. variabile* Pme., *abditum* Held., *compressum* Pme., *rotundatum* Pme. and *ventricosum* Pme. In all, ninety-three species of mollusca were obtained, of which eleven species and three varieties were new to the fauna of the State, one species new to this country, and five species new to science.

ISAAC LEA DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

The Isaac Lea Conchological Chapter of the Agassiz Association is

a corresponding chapter. It is composed of men and women interested in the study of shells. It also has a juvenile section composed of boys and girls. It is a working chapter, or society, as every member is expected to send an annual report of work done by him. These reports and such papers as the members may furnish are known as the transactions of the society. Each year the volume of transactions, in manuscript, is forwarded from one member to another until each member has read the book, but as some time must necessarily elapse before all the members of the chapter can receive it, the editor of *THE NAUTILUS* has kindly consented to allow space for extracts from the transactions in *THE NAUTILUS* each month. Each member in this way can have a copy of the annual reports to himself.

The Chapter is officered as follows:

President, Prof. Josiah Keep, Mills College, Cal.

General Secretary, Mrs. M. Burton, Williamson University, Los Angeles County, Cal.

SECRETARIES OF SECTIONS :

Section A.—Marine shells of the West Coast, Prof. Keep, Mills College, Cal.

Section B.—Marine shells of the East Coast, Mr. A. H. Gardner, Box 84, Fort Hamilton, N. Y.

Section C.—Land shells east of the Rocky Mountains (Sec. not yet chosen).

Section D.—Fresh water shells east of Rocky Mountains, Dr. W. S. Strode, Lewiston, Ill.

Section E.—Land and fresh water shells west of Rocky Mountains (Secretary not yet chosen).

Section F.—Fossil shells, Hon. Delos Arnold, Pasadena, Cal.

Section G.—Juvenile Section, Mrs. Mary P. Olney, Spokane, Wash.

Section H.—Microscopic shells (Secretary not yet chosen).

A STUDY OF FOSSIL SHELLS.

Report of Josiah Keep. From the Transactions of the Isaac Lea Conchological Chapter of the Agassiz Association for 1894.

Two years ago last summer, as I was returning to California from the Atlantic Coast, I had occasion to stop for a number of hours in the city of Cincinnati. By far the cheapest and most satisfactory

way to explore a city is to get on a street car and ride until you are told to get off, and then try another line in like manner.

Acting on this principle I hailed an electric car and was soon hurrying along the streets, up one hill and down another, and then over level stretches till I arrived at the "Burnett Woods" park. I did not need to be told to get off here, for the condition of things was evident, and this was, without doubt, the best place to spend the hot hours of mid-day. I was delighted with the place at once. What grand old trees were there, beeches and oaks and walnuts, majestic specimens with huge trunks and great spreading limbs.

Strolling across the little hills and valleys which make up the park, I came at last to a huge excavation where a new street was being cut out and an old one widened. A gang of prisoners, under the eye of armed guards, were working there in the hot sun. Some were shoveling away the loose soil, others were breaking up hard strata with their picks and bars, while still others were down to bed-rock, and were drilling holes for blasting.

The rock looked interesting, and I drew near to a cliff which had been partly carried away, and was delighted to find that the rock was full of fossils. In some places it was literally made up of shells and corals, and, so perfectly were they preserved, that you might trace every mark of sculpture on the shell, and observe its outline as perfectly as if it had just been brought up alive from the ocean.

Most of the shells were those of brachiopods, a class of mollusks that now exist but sparingly, though in ancient times they must have been as thick as the leaves of a forest.

How I longed for increased facilities for transportation on that July day. I wanted to take away at least a barrel of the fine specimens! They lay all around me, and it almost broke my heart to leave some fine pieces of stone studded over with those choice relics. But when I lifted one of those pieces and found that it weighed many pounds, I was reluctantly compelled to carefully put it down and content myself with a few fragments that were not too large for my coat pockets. One of these fragments is before me as I write.

What a story these old reliques tell to one who is able to interpret their language. How many ages have passed away since each pair of these shells contained a living occupant, a creature without gills, indeed, but supplied with a pair of feathery arms which it stretched out and waved in the warm waters of the Silurian sea. When its little life was over, the shell sank down in the mud and was quickly filled and covered with the soft ooze.

All this took place when the ocean rolled over what is now the State of Ohio; before there was any coal, long before there were any Appalachian Mountains, and so long before the creation of Adam, that the time since the first man seems but a little while in comparison.

Century after century went slowly by, the land gradually rose, and the ocean slunk away.

Then came a time when uncouth monsters ranged over the soil; then a period of ice and desolation; then the age of man. But through all these uncounted millions of years, one little shell was quietly waiting—waiting a thousand thousand years, until the blast of the convict gang threw it up to the surface, and the sun shone down upon it, and a human being rejoiced to find it there. Could it speak, how it would inquire what had become of the ocean. Simple little shell, you have had a long sleep, but the world has been awake and astir all the time.

Perhaps this paper seems little like a conchological report, but, during the past year, most of my work with shells has been, not with modern species, but with fossils. I have been arranging a geological cabinet, and have been putting into their places molluscan species, from the little *Lingula cuneata* of the Lower Silurian rocks, down to those species which are now living along the coast.

How important it is for any one who desires to understand the noble science of geology, to first learn as much as possible of its handmaid, conchology. The shells of mollusks are the most enduring of fossils. They are the seals impressed upon the stony documents of the distant past, by which the scholar can tell you, often in a moment, the age in which those documents were written, and what of value you will be likely to find therein.

It may not be scientific, but I love to imagine that the mollusks which secreted these shells are alive once more. I question them concerning the past, concerning their contemporaries and their surroundings. I open the Devonian drawer of fossils and ask those revived mollusks to tell me concerning the "Age of Fishes." The little *Pupa vetusta* of the Carboniferous Age tells me a story of its life in the "dim watery woodlands" of the Coal Period.

Ammonite and Hippurite discourse concerning the "Age of Chalk;" the giant *Ostrea* details the quiet story of Tertiary times, and, finally, a little Olivella, such as now sports in the sands of the beach, tells me how it came to be buried in a little hill that has evidently been raised from the ocean in comparatively recent times.

And so the great story of life is narrated; a story so wonderful, so interesting, so full of suggestion of a great and wise Creator, that I take up the burden of life once more, encouraged, instructed, broadened, helped!

THE ANNUAL REPORTS PRESENT A VARIETY.—As the members of the Isaac Lea Chapter are found from Maine to San Diego, Cal., and while some live on the sea coast, others dwell near lakes and rivers, while others again reside far from any body of water, the annual report of work done by each member is varied. Some members have had years of experience, while others, perhaps, give us their first years' experience in collecting and studying molluscan forms of life; but each report is interesting, and, from month to month, we hope to give one or two reports of the members of our Chapter. This month our members will be interested in Professor Keep's paper on fossil shells. After reading it, our juvenile members will be glad to learn that Professor Agassiz, in his "Geological Sketches," tells about the Silurian fossils of Cincinnati, Ohio, and what he says about the fossil beds adds new interest to the report of our President.

University P. O., Los Angeles Co., Cal.

AN UNDESCRIPTED MERETRIX FROM FLORIDA.

BY WM. H. DALL.

Meretrix simpsoni n. s.

Shell small, plump, concentrically grooved, but somewhat irregular in sculpture, smoother toward the beaks; varying in color externally from pure white to livid bluish overlaid with streaks or zig-zag brown lines, the interior from pure white to deep bluish purple; the most common color variety much resembles Sowerby's figure of *C. hebraea* Lam. (Thesaurus, pl. 134, figs. 143-4), but with the posterior end more rounded, the hinge teeth more compressed and smaller, and with a well-developed pallial sinus reaching to the vertical of the beaks; the lunule is smooth, long-ovate, marked off by an incised line, but not differentiated by color or otherwise from the adjacent parts of the shell; the escutcheon is obscure.

Alt. 15·0; lon. 18·0; long. of post-umbonal part 11·0; diam. 8·0 mm. Habitat from Curaçao and St. Thomas, West Indies, to Cedar Keys, Florida, from low water to 26 fathoms; Chas. T. Simpson and other collectors, in the U. S. Nat. Museum.

This is probably the species which has been identified by Antillean collectors with *Circe (Lioconcha) hebraea* (Lam.) Sowerby, but it is a smaller shell and a true *Meretrix*, represented by specimens from seven localities in the Museum collection and noted in Bull. 37, U. S. N. M., p. 56, No. 285 in 1889.

NOTES AND NEWS.

UNIO ELLIPSIS AND U. TENUISSIMUS.—I have never seen *Unio ellipsis* Lea and *tenuissimus* Lea noted from Grand Rapids, Mich. I wish to report the finding of 23 specimens of *ellipsis* and 24 of *tenuissimus* in Grand River, about two miles south of the city; they were taken by me last summer.—W. MILLER, Grand Rapids, Mich.

MR. WM. B. MARSHALL, formerly on the zoological staff of the N. Y. State Museum, at Albany, is now in Washington as an assistant in the Dept. of Mollusks.

DR. WM. H. DALL leaves Washington on the 16th of May to spend the summer in Alaska in field work.

MESSRS. USELMA C. SMITH AND ROBERTS LEBOUTILLIER, of Philadelphia, have returned from a naturalizing trip to Jamaica.

GONIOBASIS VIRGINICA Gmel. occurred in considerable numbers in the stomach of a specimen of the American Golden Eye (*Cluvionetta clangula americana*) from a Philadelphia market, which I examined March 28.—H. W. FOWLER, Phila.

MR. EDW. W. ROPER, of Revere, Mass., has returned from Jamaica, where he has spent the winter. Good success in collecting shells and ferns is reported.

NEW PUBLICATIONS.

MISSION SCIENTIFIQUE AU MEXIQUE, etc., *Etudes sur les Mollusques Terrestres et Fluviatiles*, par MM. P. Fischer and H. Crosse (Vol. II, pt. 7). The present part contains the remainder of the *Unionidae*

and the *Cyrenidae* (*Corbiculidae*). Like those which have preceded, the execution of the plates is superb, and the text is prepared with the attention to detail and accuracy characteristic of its authors. Many species of *Unionidae* described by Morelet are herein for the first time illustrated, as well as those of Crosse and Fischer. This part completes the work, but one more will be issued containing additions to the fauna, being supplementary to the entire work.

In the *Proc. Linn. Soc. N. S. Wales*, VIII, Mr. Charles Hedley describes a new species of *Cæcum* (*C. amputatum*) from Sydney Harbor, Australia, and gives an interesting paper on *Gundlachia*. The latter we will reprint in a future number.

LISTE SYNONYMIQUE ET BIBLIOGRAPHIQUE DES MOLLUSQUES *Terrestres et Fluviaires de la Nouvelle-Zélande*. By Henry Suter, with preliminary note on the affinities of the New Zealand mollusk fauna by H. Crosse. The land mollusk fauna of New Zealand has received much careful study during the past few years, and this catalogue of 86 pages, embodying the results of the studies of HUTTON, SUTER, HEDLEY, PILSBRY and others, is a complete epitome of progress to this time. It is prefaced by a note from the experienced pen of CROSSE, contains copious references, and a plate illustrating some interesting forms. The work is well-done and of great utility.

MONOGRAPH OF THE GENUS *STROPHIA*, by C. J. Maynard (Contrib. to Science II, Nos. 3 and 4). Mr. Maynard prefaces his descriptions by some interesting observations, *inter alia*, that *Strophia* is found in the Bahamas only on islands and keys where palms grow, and does not occur on any that are not, or have not been inhabited by man. The descriptions of many new species follow. The careful and exact record of localities for each species and subspecies, is a most commendable feature of the work. There can be no doubt that the forms are in many instances extremely local in distribution, a fact which we owe to Maynard's researches. The localities given in former works on the genus are in a large number of cases wholly untrustworthy. Maynard proposes a new subgenus *Multostrophia*, type *S. eximia* n. sp., for shells with small *Maynardia*-like tooth and very fine striations. Among the figures we notice that that of *S. cinerea* (p. 119) has the axial lamella on the outer lip, doubtless an error of the engraver.

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No. 2

PLEURODONTE BAINBRIDGEI AND OTHER JAMAICA SHELLS.

BY EDWARD W. ROPER.

It was the writer's good fortune, during a recent trip to Jamaica, to stumble on the metropolis of the large and interesting land shell, *Pleurodonte bainbridgei* Pfr., at Mandeville. The locality, a heavily wooded hill near the hotel, had been neglected until many hills more remote were searched, without revealing more than an occasional dead shell. The numerous low piles of limestone fragments upon the summit were turned over with great success, the prizes including several white specimens. The common run included black with splendid purple lip, dark brown with purple or brown lip, and light brown with lip of the same color. The largest specimen was 56 and the smallest only 42 millimetres long. Only two or three specimens were over 50 millimetres long, and the lot averaged smaller than those in other collections examined by the writer. There was no variation in shape, all being low depressed conical, with finely granulated surface, and all were banded, even the white shells being encircled with a very fine semi-transparent line. This does not correspond with the typical white form, var. *pretiosa*, which is proportionately much more elevated. The Mandeville white shells differ only in color from their black and brown fellows. All variations of color are liable to be found under the same rock heap, so that environment is not responsible for the col-

oration. Indeed, it is uncertain which is the type color. The veteran Jamaica conchologist, Mr. Henry Vendries, believes, with Bland and others, that *pretiosa* is the type and the dark shells varieties. The genuine *Bainbridgei* is said to have come from Demerara, but this question of disputed nomenclature the writer will not attempt to solve. Associated with *Pleurodonte bainbridgei* at Mandeville were other interesting shells, including *Pleurodonte peracutissima*, *P. anomala*, *Stoastoma pisum*, the giant of the genus and the little *Guppya epistyliulum*.

At Port Antonio, *Pleurodonte acuta*, in shape near the type, *acutissima* Lam., but very black even to the lip, was found associated with *P. validu*. A form almost equally black, but with light lip, was found at Manchioneal. These shells were strikingly different from the varieties of *P. acuta* found in other parts of the island.

Bulimus exilis, a very common West Indian shell, but not previously reported from Jamaica, was found abundantly at Castleton not far from the botanical gardens. It was probably imported on plants.

On the hills at Mandeville, a dagger-leaved plant, which retained a considerable quantity of rain water in the axils of its large leaves, was much frequented by *Thelidomus aspera*. The mollusk was often found with its body touching the water.

NEW FORMS OF AMERICAN ZONITIDÆ AND HELICIDÆ.

BY HENRY A. PILSBRY.

Omphalina Andrewsæ n. sp.

Shell allied to *O. inornata* Say in general characters and size. Rich chestnut colored above, opaque buff below; the surface brilliant, polished. Whorls $4\frac{1}{2}$, slightly convex, slowly widening, separated by moderately impressed, margined suture; spire small, very low-convex, its width less than half that of the shell; last whorl very wide, depressed, rounded at periphery, evenly flattened-convex beneath; convex around the deeply indented umbilical perforation. Aperture slightly oblique, elliptical-lunate; interior lined with a heavy white callus which thins out and disappears a few millimetres from the lip-edge; the latter thin, sharp; columellar margin concave, expanded in a minute triangle slightly impinging on umbilicus. Alt. 8, greater diameter 16, lesser 13.2 mm.; width of spire 7 mm.

Under plants on the summit of Thunderhead Mountain. (Mrs. Geo. Andrews, June, 1894.)

With the general aspect of *O. inornata*, this species is even more polished, with somewhat rounder aperture and notably narrower spire. This last difference is very perceptible on comparing the upper surfaces of the two species. *O. andrewsae* is also in the Academy collection from Macon Co., Georgia, collector unknown. The name must not be confused with *Zonites andrewsi*, which is a species of *Gastrodonta*, a genus belonging to quite a different division of the *Zonitidae*. *O. rugeli* is a more capacious shell with wider spire than *andrewsae*.

O. andrewsae montivaga n. sp.

Like the type in the shining surface, etc., but with five whorls, chestnut above, slightly paler and subtranslucent below; last whorl more widened toward the aperture, more sloping. Aperture quite oblique, wider and shorter than in *andrewsae*, the upper and basal margins sub-parallel; *baso-columellar lip very gently curved*, not deeply rounded as in *andrewsae*. Interior without white lining, having only a narrow white rib within the lip. Alt. 8.7; diam., greater, 17; lesser, 13.5 mm.; width of spire 8.5 mm.

Same locality and collector. The very much straighter basal lip and lack of white lining differentiate this from preceding species.

Gastrodonta (Pseudohyalina) patuloides n. sp.

Shell about the size and form of *Pyramidula striatella* Anth.; light green, hardly transparent; irregularly but closely rib-striate above, below and in the umbilicus, the first 1½ whorls smooth. Whorls 4½, slowly increasing, convex, with impressed sutures; last whorl rather tubular, rounded at periphery and below; aperture about the size of umbilicus, round-lunate, flattened above, lip simple, the *upper margin flattened down and arched forward*, as in *Selenites* or *Gastrodonta elliotti*; retracted at insertion. Umbilicus large, showing all the whorls very plainly. Alt. 2.5, diam. 5.1 mm.; aperture, alt. and width about 1.8 mm.

Thunderhead Mountain, under bark of a rotten log with *P. alternata* (ribbed), *P. perspectiva*, *Gastrodonta elliotti*, etc. (Mrs. George Andrews, June, 1894).

Two adult specimens collected. It is much smaller than *G. elliotti* Redf., with far larger, open umbilicus and heavier sculpture, recalling a *Pyramidula*.

Polygyra (Stenotrema) stenotrema depilata n. v.

Globose conic, the spire much elevated; surface completely lacking hairs or their scars, showing sparse oblique short wrinkles above (hardly seen without a high power lens), the base with the luster of silk, or like the bloom on a grape, and showing indistinct spiral sculpture. Parietal tooth smaller than in the type, further from the basal lip, and not connected by a raised callus with the upper termination of the lip. Notch of basal lip rather shallow and wide. Alt. 8, diam. 10 mm.

Thunderhead Mountain (Mrs. Andrews), with typical *P. stenotrema* of the usual depressed-globose and hirsute form.

A NEW VARIETY OF OCINEBRA CIRCUMTEXTA STEARNS.

BY R. E. C. STEARNS.

A very pretty variety of *Ocinebra circumtexta* has recently been detected on the coast of Los Angeles County, by some of the local collectors. It is of a pale orange color; the bands, which in the typical form are dark, sometimes almost black, in the variety herein described are of a deeper orange. I have named it var. *aurantia*.

It is noteworthy, the prevalence of the orange hue, pale or dark, in many of the species of *Ocinebra* of the west coast.

This color is frequently met with in various shades in *Purpura crispata* of the Puget Sound and Alaska region.

Los Angeles, Cal., May 10, 1895.

NORTH AMERICAN SPECIES OF VALLONIA.¹

BY DR. V. STERKI.

Private inquiries and publications appear to make it desirable to give a few notes on our *Vallonia*, in this place. As far as known, at present, there are the following species in North America:

Group of *V. pulchella*. Not ribbed; peristome with strong lip.

1. *V. pulchella* Mull. (= *V. minuta* Say), North America, east of the Rocky Mountains; west of them at least scarce. All Europe, and adjoining parts of Asia and Africa.

2. *V. excentrica* Sterki. Northeastern North America from Maine and Quebec to Washington, D. C. All Europe. It is constantly distinct from *V. pulchella*, and, when once known, can not

¹ Conf. Observations on *Vallonia*, in Proc. Ac. Nat. Sc., Phila., 1893, p. 234.

be mistaken. Generally smaller; somewhat elongate in outline, and so is the umbiliens; the spire is smaller, lower, and the suture less deep; the peristome is not everted, as in *pulchella*, but only slightly expanded.

Group of *V. costata*. Ribbed; peristome with strong lip.

3. *V. costata* Mull. Eastern North America to the Mississippi Valley, but less common than *pulchella*, though numerous in some localities.

4. *V. albula* Sterki. Quebec, Manitoba to British Columbia. Larger than *costata* (2.7-2.8 mill.), whitish, with fine, crowded, membranous ribs; quite unlike any *costata* from Europe or North America. Also jaw and radula show differences, and so it was to be regarded as distinct, the more so as it has been found in company with *costata* at Quebec.

5. *V. gracilicostata* Reinh. Utah to Dakota. Differs from *costata* by the stronger and more oblique ribs on the shell, and small or no membranous appendages on them; the last whorl and the aperture are more angular at the periphery, and more flattened above; the color is grayish, and the lip porcelain white, while in *costata* it is somewhat glassy transparent.

6. *V. parvula* Sterki. Illinois to Nebraska and Indian Territory. Smaller than *costata* (diam. 2 mill.), the spire flat, the last whorl not descending.

Group of *V. cyclophorella*. Peristome without a lip.

7. *V. cyclophorella* Aneey. Rocky Mountains. Ribs very fine and crowded; shell thin, grayish or whitish; last whorl ascending and descending; aperture transversely elongate; peristome thin, without a lip; diam. 2.7 mill.

8. *V. perspectiva* Sterki. Appalachian Mountains, in Tennessee and Alabama; also in Iowa. Membranous ribs rather fine and crowded; spire low; last whorl descending; peristome continuous without a lip; shell thin, pale horn to colorless; diam. 2.0 mill.

ON THE GENERIC POSITION OF *PATULASTRA*? [PUNCTUM?] *PUGETENSIS* AND *PYRAMIDULA*? *RANDOLPHII*, WITH SUGGESTIONS FOR A CLASSIFICATION OF AMERICAN ZONITIDÆ.

BY HENRY A. PILSBRY.¹

Specimens of the two species named above preserved in alcohol by Mr. Randolph, of Seattle, Washington, and kindly forwarded

¹ These species were described in *NAUTILUS* for March, 1895, p. 130.

to the writer by Dr. Wm. H. Dall, have furnished preparations of the teeth enabling us to fix the generic positions of these interesting little species. *P. pugetensis* proves to be a Zonitid, with the dentition much like that of *Pseudohyalina minuscula* and *milium*, perfect laterals 4, as in *minuscula*, while *milium* has 2 or 3. The jaw, imperfect in my preparation, looks like that of *minuscula*.

P. randolphi has the characteristic dentition of *Punctum*, and with *pygmaeum* (v. *minutissimum*) and *conspectum* it makes three species of this genus for America. There are two in Europe, *pygmaeum* Drap. and *massoti* Bgt., and one in Africa, *eryophilum* Martens. Some other minute Patuloids will doubtless prove to belong to *Punctum* when their dentition is examined. *P. randolphi* has a narrower umbilicus than our other species.

So ambiguous are the shell characters of these genera of small *Zonitidae* and *Eudolontidae* that, as the event has proved, Dall was fully justified in the liberal use of question-marks in his provisional generic references. The moment their soft parts come under the microscope, broad distinctions between the groups appear, leaving no uncertainty as to the limits of the genera and families. The difficulty is to get the animals of these liliputian races alive or suitably preserved for dissection.

The classification of the numerous groups and genera of *Zonitidae* is still in an embryo condition. The forms with well-developed spiral shell inhabiting North America fall into groups as follows:

- a. ♀ System bearing a long dart-sack surmounted by one or more coronal glands, and usually containing a slender, curved dart. Subfamily ARIOPHANTINE Pils.
- b. Caudal mucus pore present; shell without opaque color-markings. Genus GASTRODONTA.
- c. Shell with internal teeth or a layer of callus on the floor of last whorl. s.-g. *Gastrodonta*.
- cc. No internal teeth or callus.
- d. Surface polished, s.-g. *Zonitoides*.
- dd. Surface conspicuously striate or costulate, s.-g. *Pseudohyalina*.
- bb. No caudal pore; shell with streak, band or flame markings, Genus PECILOZONITES.
- aa. ♀ System lacking dart-sack, etc. Subfamily ZONITINE Pils.

- b.* No noticeable shell-lobes developed; mucus pore present.
- c.* Shell small, depressed and glassy; lower part of vas deferens not enlarged, Genus VITREA.
- cc.* Shell larger, smoky; lower part of vas deferens greatly enlarged, Genus OMPHALINA.
- ccc.* Shell smoky, *Vitrina*-like; vas deferens not enlarged, Genus VITRINIZONITES.
- bb.* Right shell-lobe developed; no caudal pore. Genus VITRINA.

The positions of the genera *Pristiloma* and *Conulus* cannot be decided until their genitalia are investigated. The latter may prove to belong with *Microcystis* and *Guppya* in a sub-family *Microcystinae*, characterized by obsolescence of the sessile spermatheca. The *Ariophantinae* are well represented in the Orient by *Ariophanta*, *Nesta* and other genera. The *Zonitinae* by *Zonites* (restricted), *Rhysota*, *Trochomorpha*, etc. Although the grooves above the foot-edges are present in all *Zonitidae*, the tail pore is absent in various members of each prime division, such as the genera *Pacilozonites*, *Trochomorpha*, etc. The greatest defect in our knowledge of American forms is in respect to the *Zonitoides* and *Vitrea* groups, the shells of which offer no diagnostic genera features; and the nomenclature cannot be settled until the presence or absence of a dart-sack is ascertained in all the small species. The animals should be drowned, as ordinary alcoholic specimens of these minute forms are almost impossible to manipulate.

ISAAC LEA DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

The outlook for the Isaac Lea Chapter for this year is very encouraging; new members are coming in, and all our members are enthusiastic in regard to the possibilities of the Chapter. With THE NAUTILUS as our official organ, we hope for a brilliant future for the Chapter. This little corner of THE NAUTILUS will always contain articles from the pen of beginners, as well as from those of more advanced students of conchology.

A DAY ON THE SPOON RIVER IN ILLINOIS.

Report of Dr. W. S. Strode, Lewistown, Ill. From the Transactions of the Isaac Lea Conchological Chapter of the Agassiz Association for 1894.

Owing to sciatic rheumatism, the writer, during the past summer and fall, has been unable to do much active work in the collecting

field. But one trip was made to the Illinois River, and, unfortunately, the stream was on a "high," and the conditions unfavorable for collecting. Excepting the dredging up of some fine *Pleurocera lewisii* Lea, nothing of interest was obtained.

However, a trip was made to Spoon River at Bernadotte, twelve miles from Lewistown, on October 20, which was more fortunate. The river was at a low stage, and everything favorable for collecting. My partner was Dr. J. M. Maguire, whose hobby was not shells, but birds. Yet, as is the case with all lovers of nature, when once within the pale of her magic influence, all her animate creatures met a responsive thrill in the kindly heart of the good doctor, and I found in him an enthusiastic and efficient helper in my search for molluscan treasures.

Procuring a boat we pulled up the river to Island No. 1, five miles from the village. There at the limit of back water from the mill-dam, we expected to find some shells; nor were we disappointed, for in the shallow water above and below this island, and on the banks under clumps of willows where they were carried by the minks and muskrats, we obtained quite a number of the following *Unios*: *capax* Green, *coccineus* Hild., *cornutus* Bar., *ebenus* Lea, *elegans* Lea, *lachrymosus* Lea, *luteolus* Lami, *lurivissimus* Lea, *occidens* Lea, *parrus* Bar., *pustulatus* Lea, *pustulosus* Lea, *rubiginosus* Lea, *trigonus* Lea, *Margaritana complanata* Barnes, *Anodonta inbevilis* Say, *decora* Lea, *edentula* Say.

Landing on this little island, which covers only about one acre of ground, we ate our lunch, and the doctor collected two or three each ruby-crowned and golden-crowned kinglets, that were busily seeking a dinner in the willows, and we then turned our boat's head down stream on our return voyage to the village. Every half mile or so we would come upon a flock of the beautiful moon ducks or dab-chicks, and, in the trees along the banks, were many red squirrels, and when one was particularly sauey, the crack of the doctor's gun would fetch him tumbling into the river. When the village was reached, we determined to try our luck in the shallow water along the rocky banks a half mile or so below the mill-dam.

The water-gates of the mills had just been shut down, and this would give us six inches less water to work in than when they were open. We soon descreed an unexpected advantage from this fact. A half mile down the river, just above a place called the "deep hole," we found a large number of *Unio donaciformis* Lea and *Pleurocera elevatum* Say. In thirty minutes we picked up 200 of

the little Unios, and over a pint of the univalves. They were evidently making their way up stream, excited to do so by the strong millrace current. Many of them were busily working their shells out of sight in the coarse sand, and if we had been an hour or so later, perhaps none would have been visible.

Having collected all we desired of these two species, we went below the deep hole, and, in water from one to two feet deep, collected all we cared to haul home of the following species :

Unio ulatus Say. A few.

Unio anodontaoides Lea. Very plentiful and fine, ranging in size from full grown ones seven inches long to the very small young ones an inch in length; and both varieties, the plain brown colored and the beautifully rayed ones.

Unio occidens Lea. Some very good ones.

Unio gibbosus Barnes. Only a few found, along with its cousin, the *anodontaoides*, and *U. rectus* Lamarek, a half-dozen.

U. gracilis Barnes. Quite plentiful.

U. laecharymosus Lea. Some nicely marked ones.

U. ligamentinus Lam. More numerous than any other mussel in this locality. Specimens 5 to 7 inches long, were nicely rayed and but little eroded on the beaks.

Unio multiplicatus Lea. Four or five of the gigantic ones, 7 to 8½ inches long and a foot in circumference.

U. plicatus Lesueur. Plentiful, and all sizes.

U. tuberculatus Barnes. Plentiful, and all sizes, from 7 inches down.

Margaritana rugosa Barnes. A few adults found.

M. complanata Bar. Very plentiful and very fine, all sizes, from the beautifully-rayed young specimens, to the full sized adults peculiar to this river. One lying before me as I write, is 8½ inches long and thirteen inches in circumference.

This water was too swift and the bed of the river too rocky for the *Anodonts*, and only a few *elatula* Say and *grandis* Say were found. Having loaded our boat with only the finest ones, and as many as we could get in our buggy, we pulled back up to the town, loaded up and departed for home, well satisfied with our day's outing.

A VISIT TO A VESSEL THAT WAS LOADED WITH SHELLS.—This winter I was much interested in a vessel which came into the port of Boston loaded with nothing but shells. I obtained a beautiful specimen of *Spondylus*, pink with white spines, and I can find noth-

ing like it in the museums here nor near Boston. Also a specimen of *Oliva*, beautifully marked. I visited the vessel three or four times, and was kindly allowed to visit the hold of the vessel, which had to be entered on hands and knees. *Tellinus*, *Conus*, *Myas* and other shells by heaps and bushels was a sight to behold and never forgot.

I have taken great interest in the Isaac Lea Conchological Chapter, and have obtained much assistance in my work through it, and by coming in communication with the other members of it.—*Extract from the Transactions of the I. L. C. C.*, for 1894, by Mrs. T. E. Ruggles, Milton, Mass.

NEW PUBLICATIONS.

A MONOGRAPH OF THE LAND AND FRESHWATER MOLLUSCA OF THE BRITISH ISLES. By John W. Taylor, F. L. S.—We have indicated the scope of this long-expected work in a former issue (Dec, 1894, p. 96). The first part is now before us, and well sustains the expectations excited by the prospectus, the fact that Mr. Taylor has been devoting the study of years to the subject, and by the knowledge that a number of excellent observers were co-operating with the work, and most of the members of the Conchological Society of Great Britain have contributed data for its pages.



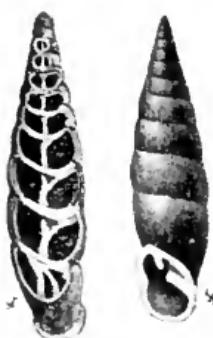
An Anisopleurous Pulmonate Gastropod, *Helix aspersa* var. *zonata* Moq.

The present fascicle of 64 pages treats of necessary elementary facts of the science of conchology; the broader principles of classification; primary divisions of *Mollusca*; of nomenclature, synonyms, etc. The shell, its composition, structure and forms are then considered, and here are defined the terms used in technical descriptions of mollusks, "turreted," "fusiform," "depressed," "turbinate" and so on, each explained briefly and illustrated by a figure in the text. This is an extremely valuable feature, for it makes perfectly clear to the beginner in conchology the whole jargon of descriptive terms, and, by a well-chosen illustration, fixes it in the mind.



A reniform Bivalve, *Unio margaritifer* v. *sinuata* Lam.

The parts of the shell and their names are similarly depicted.



Section through the shell of *Clausilia laminata* (Mont.) x 2, showing the nearly straight columella.

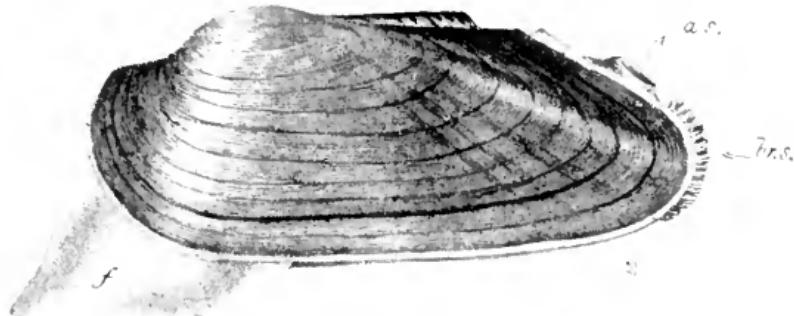
Pyriform univalve, *Clausilia laminata* (Mont.).

The questions of species and varieties are then discussed at length. The definition of "species" is good; but that of "variety" seems to us to beg the question entirely. Thus, in one paragraph, a variety is said to be an incipient species; in another, "varieties may be individual, that is, occurring only in a more or less isolated and sporadic way, or they may be a sexual character," etc. American naturalists, at least, do not regard such deviations as this as "varieties," but use that term for what Mr. Taylor calls "a sub-species, geographic variety or race." We believe that sexual and "random" variations should have no place in specific nomenclature. It is also unfortunate that

Mr. Taylor (in common with Mme. Paulucci and others) uses the term "mutation" to express a slighter modification than "variety," as it has a very different significance in paleontology, expressing the successive stages of a specific form, or genetically related series of specific forms, in successive formations.

In treating of the causes of form-modification in shells, Mr. Taylor states that fluviatile species tend to develop a lengthened shell under the influence of a steady and rapid current, and short forms of otherwise elongated species in lakes and other large bodies of water.

Excellent illustrations are scattered freely throughout the text, illustrating at every point the statements made or the peculiarity mentioned; and this is a new departure in conchological treatises



An Equivalve, Inequilateral Pelecypod *Unio pictorum* (L.), *a. s.* anal or excurrent siphon; *b. s.* branchial or incurrent siphon; *f.* foot.

which can hardly be too warmly commended. The illustrations herewith shown are examples, and in beauty and fidelity to nature they speak for themselves. One would be critical indeed to ask for anything better than the figure of *Unio margaritifer* or *Planorbis cornutus*. The species will be illustrated with colored plates, of which one accompanies this part. It is a really superb piece of color-printing.



Vertigo antivertigo
(Drap.).



Planorbis cornutus var. *albina*
Mod.



Helix nemoralis
L.

Malacologists will look with interest for the succeeding parts; for that before us leads us to hope that Mr. Taylor will break with the time-honored but woefully antiquated system of generic and family classification of former English manuals of land and fresh-water mollusks, and adopt a nomenclature and classification abreast of the science. The work will doubtless prove of great utility to those interested in British malacology, especially on account of the exhaustive treatment of variation and distribution contemplated; and the features noted above will, moreover, render it useful to conchologists generally.

THE NAUTILUS.

VOL. IX.

JULY, 1895.

No. 3

A REMARKABLE MONSTROSITY OF *FULGUR CANALICULATUM*.

Fulgur canaliculatum is one of the most conspicuous Gastropods of our coasts from Long Island to the Chesapeake. It occurs less abundantly as far south as Florida (east coast) and northward to Cape Cod.



FIG. 1. *F. canaliculatum*, deformed.

In the Tertiary series, *F. canaliculatum* appears in the Pliocene of North and South Carolina (Wacamaw and Croatan beds); and pass-

ing downward, we find in *Fulgur coronatum* var. *rugosum* Conrad, from the Miocene of St. Mary's, Md., its probable ancestor.

F. canaliculatum exhibits but little variation in the recent fauna, except in point of size, southern specimens becoming much smaller. Thus, at St. Augustine, Florida, the largest shells found are not over half the dimensions of the largest from the New Jersey coast.

The typical form of this species is shown in fig. 2. Mr. James A.

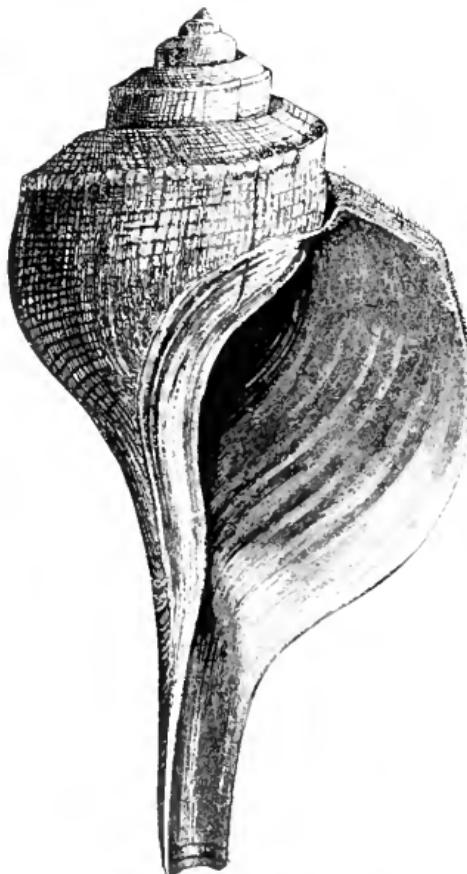
Harkins, of Atlantic City, has called our attention to a remarkable deformed specimen, which he found at that locality, illustrated in fig. 1. It is an adult of average size, in which the basal canal is twisted to the left at a right angle to the axis of the shell. The growth-lines are everywhere unbroken, no evidence of an early fracture being visible, either outside or within the aperture. There is an abnormal lump or callus upon the upper part of the columella, probably deposited to fill some space left by the altered position of the soft parts in the cavity.

It is difficult to say how a monster of this sort was produced. The unbroken sweep of the growth-striae

from body-whorl upon the

FIG. 2. *Fulgur canaliculatum*, Say.

canal indicates that the present canal was formed entirely after the abnormal condition set in, and is not a case of shell fracture and subsequent "patching" of the pieces, such as is often found. It is probable that the columellar side of the canal in the half-grown individual was injured, both soft and hard parts being affected; the mantle lining of the outer lip and base of canal being unhurt.



The specimen has been presented by Mr. Harkins to the collection of the American Association of Conchologists.

C. W. J. & H. A. P.

DESCRIPTION OF A NEW VITREA FROM PUGET SOUND.

BY W. H. DALL.

Vitrea Johnsoni n. s.

Shell small, pale waxen-white or translucent, of three and a half whorls, rather rapidly enlarging, smooth except for delicate radial lines of growth which are occasionally visible; suture distinct, slightly impressed; spire hardly elevated but not flattened; periphery rounded, base convex, imperforate, the pillar lip strongly reflected close to the axis; aperture semilunar, sharp edged, the peristome hardly flexuous, the upper edge a little in advance of the lower; resting stages indicated internally by one or two narrow whitish streaks where the shell is slightly thickened, but which do not project internally. Height of shell 1, major diam. 2, minor diam. 1.5 mm.

This differs from *V. indentata* by the absence of the impressed radial grooves and by its much smaller size for the same number of whorls; from *V. subrupicola* Dall by its more rapidly enlarging last whorl and more ample aperture in specimens of the same size. The latter species has one whorl less in the same diameter, and attains, when fully developed, a much larger size, besides having a peculiarly flattened appearance both above and below.

V. Johnsoni was named in honor of Prof. O. B. Johnson who has done so much to promote interest in the mollusk fauna of the Puget Sound region. It was collected under chips with *Vitrea pugetensis* near Seattle by Mr. P. B. Randolph.

It may be mentioned that the original types of *V. subrupicola* were collected at Clinton's Cave, Utah, by Dr. Packard; while much larger specimens, though with the same number of whorls, were collected later at Cave City, Calaveras Co., California, by Hemphill. After careful study I have found no characters except size to separate these from the Utah specimens, but in view of this difference the former may take the varietal name of *spelaea*. Neither form can be confounded with *V. indentata* by any one who critically compares good specimens. A specimen of *V. subrupicola* with four

whorls has a major diameter of 2·7 mm.; one of the variety, with exactly the same number of whorls, measures 4·0 mm., and my largest specimen 5·5 mm.

HELICES IN ILLINOIS.

BY W. S. STRODE.

In the Spoon river region of central Illinois, *Polygyra multilineata* is probably the most numerous of all the Helices. In the heavily wooded districts bordering the banks of the stream, where rotten logs, decaying leaves and vegetation are in the greatest abundance, they attain the largest size. Further back near the bluffs they are much smaller, not being more than one-half the size of those found near the river's bank. This difference which is due probably to environment, has given rise to the so-called *multilineata major* and *minor*. Not long since while driving across the bottom a mile from the river, I noticed many snails in the wagon track and crawling across the road. Just on my left was a tract of swamp prairie land containing several acres. The previous season this had grown up with tall prairie grass two or three feet in height, but a day or two before it had burned over. Going over to it I found the ground thickly strewn with *multilineata* which the fire had killed. Wherever a bit of grass, log or rail had escaped the fire, live ones could be picked up by the handful. It was the most extensive snailery I had ever seen. Thousands of them dead and alive, but not an *albolabris* nor a *profunda* nor a *Helix* of any kind except the *multilineata*; and in coloration from those that were almost albinos to the *rubra* with scores of lines, and all were the *minor* variety. *Pyramidula alternata* is the next species in relative abundance. Taking both upland and lowland it probably will outrank the *multilineata*. Then comes the *appressata*, which in some localities is quite abundant. *P. hirsuta*, *profunda*, *mitchelliana* and *albolabris* will rank in the order in which I have placed them. On the overflow land of the Illinois River a snail is rarely to be found. Further back near the foot-hills and on the margins of creeks tributary to this stream, they are quite common and fine. In these localities are to be found a few *Polygyra elevata* Say, quite rare in the Spoon River region.

DR. JOHN A. RYDER.

Dr. John Adam Ryder, Professor of Comparative Embryology at the University of Pennsylvania, and one of the most eminent embryologists and histologists in the world, died at his residence in Philadelphia, March 26, after a short illness, at the age of 43 years. The immediate cause of his demise was a complication of nervous troubles, which brought on gastric symptoms. Dr. Ryder was a very hard student, and his death was doubtless caused largely by over study.



JOHN A. RYDER, PH. D.

Dr. Ryder was born near Loudon, Franklin County, Pennsylvania, in 1852. He received a common school education and entered an academy, where his educational course was interrupted by financial reverses to his father. He then adopted his life work

teaching, and entered as a Jessup scholar, under an endowment held by the Academy of Natural Sciences of this city. He speedily showed great interest in scientific study and pursuit, and immediately began original research which has made him prominent in scientific circles. His mind was stored with a vast accumulation of facts which he so aptly used afterwards in illustrating his lectures. Early in life he began the publication of those original investigations that soon stamped him as one of America's foremost biologists. Later he was called, by the late Professor Spencer F. Baird, to the position of Embryologist to the United States Fish Commission.

The succeeding years, up till 1886, were spent in investigating the development, habits and breeding grounds of the oyster, sturgeon and other fishes, and in elaborate investigations bearing on these. His published papers on the oyster number about fifteen, and contain suggestions whose economic value is only now beginning to be recognized. His works and papers on the sturgeons and on propagation of the salmon are the most exhaustive upon these particular lines of study extant. These have been published in the bulletins of the United States Fish Commission, and have attracted the attention of American and European scientists. By means of Professor Ryder's method, the great fresh water lakes are now annually stocked with many thousand young sturgeon.

Dr. Ryder, four years ago, made an extended investigation of oyster culture at Sea Isle City, and the results of these studies are expected to revolutionize oyster culture.

He proved that oysters could be cultivated by artificial methods by starting with the egg, and, under conditions which can be controlled, and within a prescribed area and cost, that oysters could be raised by persons possessing the proper knowledge. He also wrote extensively upon the development of cetaceans and other mammals, and the thoughts and ideas advanced by him and the line of investigation opened up have been seized with avidity by scientists.

In 1886, he was invited to take the Professorship of Comparative Embryology at the University of Pennsylvania, and thereafter, although actively engaged in undergraduate and graduate teaching, he still was busy with his pen. The Proceedings of the Academy of Natural Sciences, of the American Philosophical Society, the *American Naturalist*, as well as the most prominent of European journals, were enriched by his contributions. Dr. Ryder was a strenuous opponent of the Weissmanian school of biological thought, believing,

as he did, that all phenomena of living organisms could be explained by the laws of mechanics. He was one of the foremost of mechanical evolutionists.

His chief writings and papers embrace "The Inheritance of Modifications Due to Disturbances of the Early Stages of Development, Especially to the Japanese Domesticated Races of Golden Carp;" "Dynamics in Evolution;" "The Mechanical Genesis of the Form of the Fowl's Egg;" "A Physiological Hypothesis of Heredity and Variation;" "The Origin of Sex Through Cumulative Integration, and the Relation of Sexuality to the Genesis of Species;" "On the Mechanical Genesis of the Scales of Fishes;" "The Sturgeons and Sturgeon Industries of the Eastern Coast of the United States, etc.;" "The Development of the Common Sturgeon;" "Evolution of the Specialized Vertebral Axes of the Higher Types;" "A Physiological Theory of the Calcification of the Skeleton," and "The Origin and Meaning of Sex."

Dr. McFarlane, speaking of Dr. Ryder, said: "He was, undoubtedly, one of the three greatest embryologists. His true worth was not known by the public, but the scientists with whom he was associated readily appreciated his great genius. His relations with his friends, colleagues and students were marked by a simplicity, earnestness and straightforwardness of purpose that endeared him to all. He enjoyed a profound reputation in Europe, and the news of his death will call forth the deepest sympathy from friends of science everywhere."

DR. W. S. W. RUSCHENBERGER.

Dr. William S. W. Ruschenberger, the eminent naval surgeon and scientist, died March 29, at his home, 1932 Chestnut Street, Philadelphia, in his 88th year.

Dr. Ruschenberger was one of the most widely known members of his profession in this country. He was born in Cumberland County, New Jersey, September 4, 1807. After receiving an academic education in Philadelphia and New York schools, he entered the medical service of the United States Navy as a surgeon's mate, August 10, 1826.

He was commissioned a surgeon in the navy April 4, 1831, and from 1835 to 1837 was Fleet Surgeon to the East India Squadron, with which he circumnavigated the globe. In 1840-42, Dr. Rusch-

enberger was attached to the naval rendezvous in Philadelphia. From 1843, he was Superintendent of the United States Naval Hospital at Brooklyn, and, during his term of service there, organized the Naval Laboratory, for supplying the service with pure drugs. He was again Fleet Surgeon of the East India Squadron from 1847 to 1850; Fleet Surgeon of the Pacific Squadron from 1854 to 1857, and of the Mediterranean Squadron from August, 1860, to July, 1861, having served in the intervals between cruises at Philadelphia.

In 1871, he was commissioned Medical Director on the retired list, with the relative rank of Commodore.

Dr. Ruschenberger has been best known in Philadelphia, perhaps, for his scientific labors, and particularly for his efforts in behalf of the Academy of Natural Sciences, which bestowed on him the highest honors within its gift.

He was elected Vice-President of the Academy in January, 1869, and President in December of the same year, serving in the latter office until 1881, when he was succeeded by Dr. Joseph Leidy. At the time of his death he was one of the curators, and Director of the Conchological Section.

Dr. Ruschenberger won considerable reputation by the results of his scientific observations during his various cruises, which he published at different times. Some of his works were: "Three Years in the Pacific," "A Voyage Round the World," "Elements of Natural History," "Lexicon of Terms Used in Natural History," "Notes and Commentaries During a Voyage to Brazil and China." Besides these, he wrote "A Notice of the Origin, Progress and Present Condition (1852) of the Academy of Natural Sciences of Philadelphia," and various other pamphlets.

Dr. Ruschenberger's works on Natural History were among the first American treatises on this subject, and were largely instrumental in creating an interest in zoology in this country. One of the most eminent entomologists in America, in speaking of Dr. Ruschenberger, said that he had first learned the orders of insects from Ruschenberger's Natural History.

THREE NEW SPECIES OF MACOMA FROM THE GULF OF MEXICO.

BY WILLIAM H. DALL.

Macoma limula, n. s.

Shell small, long and narrow, moderately inflated, anterior end rounded, longer; the posterior end subrostrate, bent to the right;

the pallial sinus deep, reaching more than half way from the vertical of the beaks to the anterior adductor; one bifid cardinal tooth in the left and two in the right valve, without laterals; ligament short, strong; exterior with nearly smooth beaks and no radiating lines, but most of the valve covered with low elevated concentric irregularly broken lines, which are irregularly swollen or granulose minutely in a longitudinal sense; color of the shell pale lemon-yellow or white, without distinct epidermis. Alt. 6·0, lon. 13·0, posterior end 6·0, diam. 3·5 mm.

Gulf of Mexico west of Florida in 26 fathoms; off Cape Lookout, N. Carolina, in 22 fathoms; Barbados in 100 fathoms.

This curious shell is distinguishable from any other American species by its peculiar surface. It grows twice as large as the measurements given above.

Macoma Mitchelli, n. s.

Shell small, thin, polished, pinkish-white, moderately inflated; teeth as in *M. limula* but more feeble; valves closely resembling *Tellina versicolor* Cozzens, but without the lateral teeth, less solid, the pallial sinus more distant from the anterior adductor, the posterior dorsal slope less arched and not quite so long, the muscular impressions less impressed and the anterior end somewhat broader; in *M. mitchelli* the surface is mostly smooth, but near the ventral margin, especially in front, there are impressed, somewhat distant and inconstant, concentric lines in harmony with the lines of growth or nearly so. Alt. 8·25, long. 15·0, post. end 6·0, diam. 4·0 mm. Habitat, Matagorda Bay, Texas, (I. D. Mitchell).

Macoma leptonoidea, n. s.

Shell very thin, high, short, polished, smooth or with fine silky concentric strike under a thin iridescent epidermis; hinge very feeble, teeth as in *M. limula*; pallial sinus irregular, reaching about two-thirds the whole length, backward from the front edge of the valves; outline of valves leptonoid, the anterior slope longer and more rounded, the posterior shorter and more direct but not rostrate, though there are two obscure ridges radiant backward from the beaks but not modifying the posterior margin; the shell is somewhat compressed but not flattened. Alt. 13·0, lon. 16, lon. of post. end 6·0 diam. 6·0 mm. Matagorda Bay, Texas, (Lloyd.).

This little shell looks curiously like a *Lepton*. Its outline, though larger, differs little from that of *Lepton longipes* Stm. The types of

the above mentioned species are in the National Museum, being respectively Nos. 95,619, 124,686 and 125,532.

ISAAC LEA DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

MARINE SHELLS ON THE COAST OF MAINE.

Report of Mrs. E. P. Wentworth From the Transactions of the Isaac Lea Conchological Chapter of the Agassiz Association for 1893.

During the past two years I have been much interested in conchology and have devoted my spare hours to collecting and studying mollusks.

I have collected marine shells from the Damariscotta River, Long Creek, near Portland, Peak's Island in Casco Bay, and Old Orchard and Higgin's Beaches, all these localities being in Maine. At Peak's Island the following shells were found in great abundance: *Mytilus edulis*, *Modiola modiolus*, *Mucoma baltica*, *Mya arenaria*, *Saxicava arctica*, *Buccinum undatum*, *Nassa obsoleta*, *Nassa trivittata*, *Purpura lapillus*, *Littorina rufa*, *L. litorea*, *L. palliata*, *Lacuna vincta*, *Natica heros*, *Aemona testudinalis*. Occasionally there would be found hidden in the crevices of the rocks or thrown upon the beaches, *Crepidula fornicata* and *Anomia aculeata*.

The Damariscotta River, some forty or fifty miles east of Portland, is somewhat sheltered; and it contains mollusks which might once have been plentiful all along the coast of Maine, but which are now not often found so far north. Among these shells are the *Odostomia bisuturalis* Say (if I have made no mistake in the identification), of which the extreme northern limit is Massachusetts Bay, according to Bulletin No. 37, U. S. National Museum. *Urosalpinx cinerea* is very common in Damariscotta River, and the following shells are also found there: *Rissoa minuta*, *Mya arenaria*, *Modiola plicatula*, *Crepidula convexa*, *Alexia myosotis*, *Purpura lapillus*, *Littorina palliata*, etc. There are many old shells of *Ostrea virginica* and *Venus mercenaria* buried along the banks of the river and some of the people who live near by say that within their remembrance there were many oysters and quahogs in the river and

that they have been killed out by the sawdust from the mills above. On this river are the celebrated Damariscotta shell heaps composed almost wholly of oyster shells, and varying in depth from a few feet to more than sixty feet. Some of the oyster shells from these heaps are more than a foot in length.

At Old Orchard and Higgin's Beaches the shells are very different from those found on Peak's Island or in the Damariscotta River. Here are found, on the sand, between high and low water mark, *Cyprina islandica*, *Tellina tenera*, *Ensis Americanus*, *Siliqua costata*, *Mactra solidissima*, *Nassa trivittata* (very fine specimens), *Lynsia hyalina*, *Scala greenlandica*, *Bela harpularia*, *Periploma (Cochlodesma) leanum*, *Modiola modiolus*, *Mya arenaria*, etc. Clinging to the seaweeds thrown up by the surf, I found *Trachydermon ruber*, *Anomia glabra*, *Anomia aculeata*. Also found at Higgin's Beach, a very fine *Petricola pholadiformis*.

GENERAL NOTES.

THE collection of Dr. P. P. Carpenter, the well-known authority on West Coast shells, has been purchased by the Field Columbian Museum of Chicago.

DISPERSAL OF SHELLS.—In his book on the "Dispersal of Shells," Mr. Kew mentions floating pumice-stone as a possible means of dispersal as pointed out by Mr. Bates and Sir C. Lyell. As a slight contribution to dispersal, or possible dispersal, by this means, I may say that on November 18th last I picked up a piece of porous blast-furnace slag, about 8x6x2 inches, that contained 17 individuals of *Zonites nitidus* Mull., *radiatus* Alder and *arboreus* Say, all hibernating. This slag was lying among drift on the bank of the Ohio River and the nearest point from which it could have come is at least 10 miles above the point where it was found. As the slag is very light and floats *high* in the water, it would probably travel a considerable distance before the shells were all drowned and thus a colony of *Z. nitidus*, a *northern* shell, might be started a considerable distance down the Ohio.—GEO. H. CLAPP, Pittsburgh, Pa.

PROF. H. E. SARGENT has left Woodville, Ala., to spend the summer in Clearwater, Minnesota.

PROFESSOR THOMAS H. HUXLEY, the most famous of English biologists, died at 3.35 P. M., June 29, at the age of seventy years.

DR. W. D. HARTMAN, of West Chester, is publishing an Illustrated Catalogue of the Mollusks of Chester Co., Pa., in *The Village Record*, West Chester.

PLANORBIS SAMPSONI *Ancey*, described from Sedalia, Mo., and hitherto recorded from no other locality, is in the collection of the Acad. Nat. Sci., Phila., from Athens, Illinois, collected by E. Hall.

PLANORBIS CENTERVILLENSIS *Tryon*.—This very distinct species seems to be quite widely diffused on the Pacific slope, but most western collectors call it *vermicularis* Gld., judging from the labels of numerous lots before us. It is a small, brown shell, with high whorls, flat top, concave in the middle, and narrow umbilicus, while the true *vermicularis* is a flat, corneous shell, very similar to *parvus* or small *deflectus*, and doubtfully distinct from eastern forms.

MR. S. N. RHOADS has returned from a collecting trip through Tennessee, from the Mississippi to Roan Mountain. Land shells, *Unionidae* and *Pleuroceratidae* were found abundant. *Io spinosa* was rather scarce in the Tennessee, Nolachucky and Holston Rivers under boulders in swift water. *Vitrinizonites* was taken at Roan Mountain, as well as *Polygyra andrewsae* and *major*, with other fine and local species. *Helicina occulta* Say also turned up in east Tennessee. Mammals were scarce throughout the State, except at Roan Mountain.

MOLLUSKS AS PURIFIERS OF WATER.—Charles Hedley, in the *Journal of Malacology*, says: "A use, novel to me, of pond snails by the Chinese silk-growers, is described in an official work which caught my eye by chance. This waif of malacological information is so certain to escape recorders that I transcribe the passage: 'The water used for reeling silk is taken from mountain streams, as being the cleanest; the water from wells is never used, and if mountain water cannot be had, river water is taken, which is cleaned by putting a pint of live shell-fish to one jar of water. There is a special kind of shell-fish, called the pure-water shell-fish (probably *Vivipara chinensis* Gray), found everywhere in ponds, wells and creeks. They first of all sink to the bottom of the jar, and then by degrees make their way up its sides, consuming gradually all impurities in the water within half a day or so. After the clean water has been drawn from the jar, the shell-fish are cleansed and put to the same duty again.'"

THE NAUTILUS.

VOL. IX.

AUGUST, 1895.

No. 4

PLEUROCERA SUBULARE IN WATER-MAINS

BY CHAS. T. SIMPSON.

The U. S. National Museum has recently received from the Hannibal Water Co., of Hannibal, Mo. (through Mr. Chas. T. Lewis), a number of dead shells of *Pleurocera subulare* Lea, taken from the mains and pipes of the company in that city.

Mr. Lewis states that they accumulate at the cocks and faucets, and seriously retard the flow of the water, putting the company to considerable expense to remove them; also, that none have been found in their reservoirs or settling-wells, and they have never seen them in the Mississippi River.

The specimens taken in the company's pipes are always dead, and are only found in a space of perhaps 12 to 15 blocks, and not all the pipes in this area are infested.

This species has been found as far west as the White River, Carroll Co., Arkansas, and in the Mississippi River at Davenport, from which localities specimens were obtained that are now in the National Museum Collection, though the range of this form is mostly to the eastward of these localities. It is probable that the eggs or very young entered the mains through the strainers and took up their abode in certain favorable localities in the pipes, where food was brought to them by the currents, or existed in abundance, and that a more careful search would disclose them in a living state in the service pipes.

The existence of mollusks in water pipes is no new thing, though it is always interesting, and this is the first instance I have heard of in which any of the *Plenroceridae* have such a habitat. M. Locard found 44 species belonging to 13 genera in the water-mains of Paris,¹ and that they possessed certain peculiarities, no doubt the result of their environment. These were a diminution in size and decrease of coloration on account, perhaps, of the want of light; a more slender form, as this would make the least resistance to currents and enable the mollusks to cling more securely to the pipes. The specimens of *Pleurocera* sent by Mr. Lewis did not specially differ from those in the Museum Collection from Davenport, but, as the species had only been noticed at Hannibal a few years, it is probable that there has not sufficient time elapsed in its new environment to produce any important changes.

Many other cases of mollusks living in water pipes are known, notably that of *Dreissensia polymorpha*, introduced into England from the Aralo-Caspian region, and it has proven a serious nuisance in the mains of London, Birmingham and Manchester.

MARINE SHELLS OF PUGET SOUND.

By Mrs. Marie Drake. From the Transactions of Isaac Lea Conchological Chapter of the Agassiz Association for 1894.

I have a *Glymeris generosa* Gld. which I got from Dr. Pomeroy of Vashon Is. It weighed $7\frac{1}{2}$ lbs. when alive, and was dug from a depth of three feet. Its length is $7\frac{1}{2}$ inches, width $4\frac{1}{2}$ inches. Its longest circumference is $13\frac{1}{2}$ inches. It gapes widely at both ends; rarely meets when alive. Its edges are covered with a yellowish-brown epidermis. The pallial sinus, though not very deep, is from $\frac{1}{4}$ inch to $\frac{1}{2}$ inch wide. Its distinct concentric grooves or lines are slightly irregular. The valves of this shell are strongly bulging. This shell is commonly called "Goe-duck," because it is so deep a burrower. The Indians esteem this shell-fish a great delicacy, and ornament their houses and yards with the shells. It is highly esteemed as an article of food, though quite difficult to obtain; one is said to furnish food for a whole family. Star-fish are also found by the hundreds at low tide on the mud flats, and of every hue—bright scarlet, peacock-blue, sea-green and paler tints.

¹ See NAUTILUS, Sept., 1894, p. 59.

I have found three species of *Purpura* here and many varieties, but the handsomest one is *Purpura crispata* Chemn. In my mind, the finest shell belonging to Puget Sound is this *Purpura* when banded orange and white. This shell usually does not see the light of day. Some persons prefer the deep orange variety. Both live under the water on the under side of stones or in rocky places, and are either obtained by dredging or at very low tide. *Purpura laetitia* Eseh. is not found in so deep water, hence its white color; it is exposed to the rays of the sun sometimes. About September 1st, you can notice a great many purpuras closely packed together, clinging to rocks laying their eggs, which are in little capsules and resemble yellow oats stuck on end thickly over parts of the rock. Each capsule contains three or four dozen eggs, which require about four months to hatch, if they are not doomed before by some starfish hungry for an egg dinner. You can find a few egg cases almost any time of the year, but most of the eggs are laid during the months of August and September. *Purpura* lives on mussels, limpets and barnacles, or, if food gets scarce, it will eat dead fish. But the *Purpura* are not always victorious, for, when a crab wants a "purple tea," he shows no mercy to the destroyer of other homes, but inserts his strong claws under the operculum of the *Purpura* and digs him out and devours him.

One June morning, at Point Defiance, I saw three *Calliostoma costatum* eating a sea-weed breakfast. They looked so dainty and seemed to enjoy the bright sunshine so thoroughly, that it was with some regret that I placed them in my basket.

One of my friends dug up a fine *Priene oregonensis* Redf. It was five inches long and covered with a heavy dark brown epidermis. When the epidermis is removed, the shell is white. It has a strong epidermis. I have found a few specimens of *Bittium filosum* Gld., under stones at low tide, and several *Margarita pupilla*. *Crepidula dorsata* Brod. I have found by the hundreds growing on the shells, especially upon *Placunonoma macroschisma* Desh. The *Littorina* are very plentiful and are large. I have searched for *Chrysodomus dirus* Rve., but have seen no traces of it. Perhaps it is found only on the ocean beach, and does not care for the Sound.

Modiolu modiolus L. (*Modiolus capax* Conr.?) grows to an enormous size in the vicinity of Puget Sound. My husband brought me several from Henderson Bay; the smallest measured 7 inches in length, the largest 9 inches, and was 4 inches in diameter. These

he found growing in the mud, standing perpendicular, only about an inch being visible at very low tide. They are heavily bearded near the edge, partially covered with a light brown epidermis (which is several shades lighter than the epidermis of this same species which grows in the south), and considerably eroded near the unbones. All the shells living in the mud here are somewhat eroded. These monsters have an uncanny look ; they are hermits when they grow old, do not live in clumps or groups as they do when young, or as *Mytilus edulis* does. Often I have seen a solitary *M. modiolus* upon a pile or log, which was entirely covered with *M. edulis*. They grow from $\frac{1}{16}$ inch to 8 inches in a single year. It takes muscle to remove one of the huge creatures from a rock or pile when it has fastened itself with brown byssal threads, which it spins with its huge tongue-like foot, from a sticky secretion formed at the base of the foot. They are said to live six hundred feet deep down in the ocean. Pupuras are death on mussels.

Placunamomia macroschisma Desh. is found here in great numbers. They live upon the under side of rocks which lie wholly in or part in water. A chisel is necessary to separate them from the rock, and even with this the pear-shaped byssal plug is rarely obtained entire. The interior of the upper valve is of a lovely sea-green and nacreous. The edges of the valves are thin and crumble at the least touch, which renders them difficult to clean and send away. If they grow upon other shells they are not so easily broken, but are much stronger. I have a fine specimen which I found growing in an old shell of *Cardium corbis* Mart. I obtained the byssal plug and both valves entire. The shells sometimes grow upon each other ; when thus found, a perfect specimen is more readily obtained than from a rock. These shells are often mistaken for an oyster, especially by those unlearned in shell lore ; they do resemble the variety known as *O. expansa*, though they are much larger and have the byssal opening and plug, which the oyster does not have. These bivalves are much handsomer than their southern cousins *Anomia lampe*. The animal is a bright orange, and is quite beautiful. To be prepared for the cabinet they are dipped in very hot water and the animal removed with a tiny steel chisel prepared for the purpose, then gently closed. This shell requires careful handling.

I saw a *Lunatia lewisi* Gld. eating a *Cardium corbis* very much larger than itself. I stopped this predatory proceeding, took both

home in my basket, and, after cremating the bodies, placed both shells in my cabinet. Both these shells are abundant on the Sound, and are easily obtained by digging in the sand and mud. The *Mucoma* family thrives here. I have not found *M. secta*, but *M. nasuta* and *M. inquinata* are prized by the Indians as food, and *M. inconspicua* is found by the hundred, the exterior slightly eroded by the mud in which it dwells, but the inside of the shell is of a bright, rich, shiny pink; pale yellow and pure white are also found. The shell is about the size of a finger-nail.

I was surprised to find upon the rocky beach at Brown's Point a living specimen of *Lyonsia californica* Conr. It was moving about in a pool of water among pebbles and rocks. It seems marvelous that its thin, delicate little shell could remain uncrushed an instant; but it seemed to enjoy life as well here in the rugged, stormy north as it does in the warmer waters of the "land of sunshine and blue skies."

Cardium corbis is more hardy, though, unlike most of our northern shells, it is smaller than its southern cousins *C. quadrilaterum* and *Liocardium elatum*, but it is much more numerous than either of these species.²

Pecten hastatus Sby. is called by many our "prettiest shell," and with the thousands of little spears (*hastatus*), toothed edges and delicate coloring, it is indeed a lovely shell. I saw one for the first time (living) at Point Defiance during the month of April. It was caught on the top of a rock by becoming entangled by a piece of sea-weed; it opened and closed its shell rapidly, making a curious sound. The orange color of the animal shone and glittered in the sun. The circulation could be seen and the working of the heart and other organs. This *Pecten* is a deep-water species, swims about freely in the water and moves about at the same angle as a kite does in the air. It lives among sea-weeds and is found in great abundance at Fox Island in the spring of the year. The lower valve is bleached by the sand. It lives in the water and is never exposed to the rays of the sun, hence the delicacy of the color. This shell-fish has black eyes, and can tell when a hand or a bird comes to grasp it. I have seen *Amusium caurinum* in deep water, but have never succeeded in capturing one, as it is obtained only by dredging in very deep water. It is brown outside, white within, and has 20 ribs, and is not so handsome as *P. hastatus*.

² And is also a much heavier shell than the southern *Cardium*. M. B. W.

Mya arenaria L. is highly prized here as food, and grows six inches long. *Murchisona patula* Dixon is sold in our markets. *Psammobius rubroradiata* Nutt. is more abundant and larger than in the south. It is found 5 inches long, here, partially covered with dark brown epidermis. *Tapes* and *Saxidomus* are well represented, and, though not so prettily marked, are very much larger and stronger (coarser) than those growing in the warmer waters of the south. They are almost always to be found in the markets.

Zirphaea crispata L. was recently described in one of our Taeoma daily papers by one of our Government surveyors as "a new clam."

"We have found a new shell unknown to science," etc. We were greatly amused, and sent an article to the paper the next day saying *Zirphaea crispata* ("a new clam") is found in abundance on both sides of the Atlantic, and was named by Linnaeus long ago.

Limpets I have found in great abundance and of great size. I have several specimens of *Aemula patina* Eseh. found here in the "Narrows," measuring $2\frac{1}{2}$ inches in length and $1\frac{1}{2}$ inches across. Many of this species have bands of translucent tints on their interior, and are beautifully marked outside.

A. pelta is regularly marked with stripes from the apex, which is often corroded, in adult specimens, to the base. This is a most pleasing shell; is a sort of hermit, lives alone, often easily obtained; strong, not easily broken; often pure white inside, sometimes banded. I have one with a bright yellow band inside, embossed. Large specimens measure $1\frac{1}{2}$ inches in length, $1\frac{1}{2}$ inches wide, $1\frac{1}{2}$ inches high. I have not found *A. spectrum* Nutt. nor *Lottia gigantea* Gray, here. Fine specimens and many variations of *A. scabra* Nutt. are abundant. I have found more of *A. persona* than of any other species. At Brown's point, we find at one spot a variety having a gray interior with beautiful translucent bands. This is a new variation to me. *A. asmi* Midd. is found here, and many I have not been able to classify.

I have one specimen of *Fissurella aspera* Eseh. $2\frac{1}{2}$ inches long, $1\frac{1}{2}$ inches wide and nearly $1\frac{1}{2}$ inches high.

Limpets are sometimes used for picture frames by setting them deep in wood and fastening with glue. I saw one valued at fifty dollars here.

INDEX TO CONCHOLOGISTS' EXCHANGE.

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AN INDEX TO THE "CONCHOLOGISTS' EXCHANGE."

The publication of this magazine was commenced by Mr. Wm. D. Averill, of Chestnut Hill, Philadelphia, in July, 1886. The first number was printed on a postal card. The August number (No. 2) consists of four pages, without pagination, size $5\frac{1}{2}$ x $6\frac{1}{2}$ inches. The September number contains six pages, without pagination. October number contains eight pages, which are numbered, the first being page 11; the last page (18) is blank. November number contains six pages. December number, eight pages and the last page is blank. January and February numbers (1887) each contain eight pages. March and April (Nos. 9 and 10) were printed together as a "double number," which consists of twelve pages. The May and June numbers each contain twelve pages and are a little larger, $5\frac{1}{2}$ x $7\frac{1}{2}$ inches. Vol. I. complete, contains 84 pages.

Vol. II, Nos. 1 and 2 (July and August, 1887) each contain 16 pages. September number contains 12 pages, and with this number there was another increase in size to $5\frac{1}{2}$ x $7\frac{1}{2}$. October and November numbers each contain 16 pages. December number, 12 pages. January (1888) number, 12 pages, *plus* a cover (pp. i-iv) of the same kind of paper. February number contains 8 pages and a cover (pp. i-iv). March and April were printed together, but as one number (No. 9); this contains 12 pages and a cover (pp. i-iv), and this was the last number published. Vol. II, complete, contains 120 pages, exclusive of cover pages. No index to either volume was issued. The "Exchange" contains many new generic or subgeneric names, with other important changes in nomenclature, and some new species. The Index herewith given has been arranged to aid conchologists who have not access to a complete copy of the original publication. It has been cut into short pages in order that those who have the *Conchologist's Exchange* may bind this Index with it.—H. A. P. & C. W. J.

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(To be concluded in September number.)

THE NAUTILUS.

VOL. IX.

SEPTEMBER, 1895.

No. 5

A SORA CAUGHT BY A MUSSEL.¹

When hunting in the marshes in this vicinity, September 3, 1894, Mr. Joseph D. Clark noticed a Sora (*Porzana carolina*) hopping along and trying hard to fly. His dog finally captured the bird. It had a "fresh-water clam" attached to one toe, being firmly caught by the bivalve. The poor bird, in its efforts to release itself, had



broken the bone of the toe and nearly severed it from the foot. Mr. Clark kindly presented me with his rare find, and a photograph, from which the accompanying cut was made, was taken at once. The mussel was 2.92 inches long and 1.61 wide.—JNO. H. SAGE, Portland, Conn., in *The Auk*, July, 1895.

¹We are indebted to the editor of *The Auk* for the illustration of this article. This mussel is evidently *Unio complanatus* Sol.

SYNOPSIS OF THE SUBDIVISIONS OF HOLOSPIRA AND SOME RELATED GENERA.

BY W. H. DALL.

Genus HOLOSPIRA Martens; type *H. pilocerci* Pfr.Subgenus *Holospira* s. s.

Axis large, with an internal fold in the penultimate whorl and with a parietal, basal and peripheral lamina projecting into the lumen of that whorl. Besides the type, this includes *H. goldfussi* Menke and *H. goniostoma* Pfr.

Section *Bostrichocentrum* Streb & Pfeffer, 1880.

Axis moderate, with a continuous plait, except in the last part of the last whorl; no laminae. Type *H. tryoni* Pfr. *H. veracruzianus* Dall belongs here.

Section *Haplostemma* Dall, 1895.

Axis moderate, with, in the penultimate whorl only, a short, stout axial lamina extending about half a gyration, but no other laminae. Type *H. mearnsii* Dall, New Mexico.

Section *Eudistemma* Dall, 1895.

Penultimate whorl with a parietal and a short axial lamina only, axis moderate. Type *H. arizonensis* Stearns.

Section *Distomospira* Dall, 1895.

Penultimate whorl with a basal and a short, strong axial lamina only, axis moderate. Type *H. bilamellata* Dall, New Mexico.

Subgenus *Metastoma* Streb & Pfeffer, 1880.

Axis smooth, without plaits, penultimate whorl without internal laminae. Type *H. rameri* Pfr. This includes also *H. pisonis* Dall, *H. coahuilensis* Binn., *H. semisculpta* Stearns, *H. pfeifferi* Menke, *H. remondii* Gabb., *H. crossei* Dall, *H. pilosbryi* Dall.

Subgenus *Celostemma* Dall, 1895.

Axis vertically ribbed as in *Celocentrum*, shell otherwise as in *Metastoma*. Type *H. elizabethae* Pilsbry.

The internal characters of the following species are unknown: *H. gealei* A. Ads., *H. imbricata* Martens, *H. cretacea* Pfr., *H. microstoma* Pfr. and *H. teres* Menke.

Genus *COELOCENTRUM* Crosse & Fischer, 1872.

Shell decollate, axis pervious.

Subgenus *Cœlocentrum* s. s.

Axis vertically ribbed internally. Type *C. turris* Pfr. This includes nearly all the known species.

Subgenus *Spartocentrum* Dall, 1895.

Axis as in *Bostrichocentrum*, not ribbed. Type *C. irregularare* Gabb., Lower California.

Genus *EUCALODIUM* Crosse & Fischer.

Shell resembling *Cœlocentrum*, but large, with a solid axis.

Section *Eucalodium* s. s. Type *E. ghiesbrechti* Pfr.

Axis sinuous and folded its whole length, except close to the aperture; transverse series of teeth on the radula long (65·1·65 in the type).

Section *Oligostylus* Pilsbry, 1895.

Axis straight and smooth; radula narrower (36·1·36 in the type). Type *E. blandianum* Crosse and Fischer.

Columna ramentosus J. G. Cooper, which might, from the shell, be assimilated either to *Berendtia*, *Rhodea*, or some of the above-mentioned groups, proves, from the anatomy, to be merely a section of *Bulimulus* closely related to *Leptobrysus*. The genuine *Rhodea* very probably bears an analogous relation to *Ostostomus*. It is viviparous, but the Lower Californian species is not. If the latter be deemed worthy of a sectional name, *Pseudorhodea* might be used for it. The new species of *Holospira* mentioned above are described in a report on the mollusks of the late Mexican Boundary Survey (1892-4), by the writer, which will appear, properly illustrated, in the report of the Commissioners of the Survey.

My special thanks are due Mr. H. A. Pilsbry for kind assistance rendered during the preparation of the report.

The anatomy of a curious cylindrical Austrian land snail, *Pupa obtusa* Drap., has recently been investigated by Mr. A. Protz and Professor von Martens. It proves to be no *Pupa*, but a member of the *Helicidae*, closely allied to the chalky *Helices* of Europe known as *Helicella* or *Xerophila*.

A NEW TEINOSTOMA.

BY HENRY A. PILSBRY.

Teinostoma Hidalgoana n. sp.

Shell orbicular, depressed, solid, bright, bluish-white. Spire very low, wide-conic, the apex acute. Whorls $2\frac{1}{2}$, hardly convex, the last large, rounded at periphery, depressed beneath; on its latter third the periphery descends toward the base, and immediately behind the lip is decidedly pinched into a short rounded keel. Surface closely engraved throughout with spiral lines of close, fine stippling or punctation. Aperture oblique, rounded, except for the straight parietal wall; peristome continuous, the outer lip thick, blunt, strengthened outside by a heavy rib or collar a short distance behind the edge; parietal wall bearing a low nodule or tooth near its upper termination. Parieto-umbilical callus heavy, deeply and coarsely pitted all over, forming a rounded lobe over the umbilical tract and a band in front of the parietal edge of peristome proper. Alt. 2, diam. 3.2 mm.

Singapore (Dr. S. Archer!). This exquisite species is respectfully dedicated to Dr. J. G. Hidalgo, of Madrid, author of numerous valuable contributions to malacological science.

One specimen of the type lot is much smaller than the others (diam. 2 mm.), but in all other respects exactly resembles them, and has the lip of a fully mature shell.

NOTES ON THE SMALLER AMERICAN PLANORBES.

BY E. G. VANATTA.

Including the species put in the sub-genera *Menetus* and *Gyraulus* by Binney in "Land and Fresh-water Shells of the United States."

The smaller species of *Planorbis* are, as a general rule, found on leaves and sticks in small ponds and springs.

The Western Slope species are *centervillensis*, *opercularis*, *opercularis* var. *oregonensis* and *callioglyptus*.

P. alabamensis Pils. has so far been found only in Woodville, Alabama, and Grove, Cooper River, S. C.

P. sampsoni has been found hitherto only in Pettis and Henry Co., Mo., and Athens, Ill.

P. umbilicatellus occurs in Manitoba and Montana.

The other species mentioned below are more or less widely distributed over the United States, except *hirsutus*, which is restricted to the northern tier of States.

I think any normal specimen can be identified by the following key:

II. PERIPHERY ACUTELY KEELED.

a. Shell bi-convex.

- b.* umbilicus broad, shallow, *deflectus* Say.
- bb.* umbilicus small, deep.
 - c.* lip simple, aperture extremely oblique, *exaeetus* Say.
 - cc.* lip thickened within, aperture less oblique, *alabumensis* Pils.

aa. Upper surface flat, lower convex.

- b.* lip thickened within, spiral sculpture distinct, *oregonensis* n. sp.
- bb.* lip thin, spiral culture absent, or very indistinct.
 - c.* umbilicus broad, shallow, *eracetus* Say.
 - cc.* umbilicus small, deep.
 - d.* shell very small, radially ribbed below, *cristatus* Drap.
 - dd.* shell rather large, smoothish, *opercularis* Gld.

II. PERIPHERAL KEEL BLUNT OR ABSENT.

- a.* Radially ribbed below, *cristatus* Drap.
- aa.* spiral sculpture distinct.
 - b.* umbilicus broad, shallow; surface with spiral rows of hairs, *hirsutus* Gld.
 - bb.* umbilicus small and deep.
 - c.* shell rather large; aperture oblique, broader than high, keel indistinct, *callioglyptus*.
 - cc.* aperture small, nearly vertical, of equal width and height, periphery more angular, *sampsoni* Ancey.
 - aaa.* Surface smooth or nearly so.
 - b.* umbilicus broad and shallow
 - c.* aperture oval, whorls rounded, *parvus* Say.
 - cc.* aperture broader than high, whorls angular, *deflectus* Say.

bb. umbilicus small, deep.

cc. lip thickened within, *centerrillensis* Tryon.

cc. lip simple, thin.

dd. whorls angular above the middle, *dilatatus* Gld.

dd. whorls rounded or angular below the middle.

ee. spire sunken in center, *deflectus* Say.

ee. spire level, apex not sunken.

umbilicatellus Ckll.

Planorbis callioglyptus n. sp.

Shell thin, yellowish corneous. Upper side flat, only a trifle concave in the middle; lower side convex; periphery very bluntly indistinctly angular, and midway between periphery and suture there is a slight angle; but both angles are obsolete at aperture; base often spirally malleated. Surface with a beautiful sculpture of fine spiral incised lines, crenulated by fine growth-lines. Whorls nearly 4. Umbilicus nearly a third the shell's diameter, deep and funnel-shaped, its edge bluntly angular. Aperture ovate truncate, moderately oblique. Lip not thickened inside. Alt. 3, diam. 8 mm.

Freeport, Washington, collected by H. Hemphill.

Planorbis opercularis var. *oregonensis* n. v.

Shell light yellowish, opaque. Upper surface flattened, slightly convex, the apex sunken; periphery keeled with a slight groove above the keel. Surface finely spirally striated. Umbilicus rather small and deep, its edge slightly angular. Aperture approaching vertical, *lip thickened within*. Alt. 2, diam. 6 mm.

Salem and Portland, Oregon. This looks very much like typical *opercularis*, but may be distinguished by the beautiful spiral sculpture and thickening within the lip. It differs from *callioglyptus* in having a decided keel around the nearly flat upper surface and a distinct thickening within the aperture. I have not seen any typical *P. opercularis* from Oregon. There are none in the collection of the Academy of Natural Sciences.

SYNONYMS.

P. billingsii Lea = *purrus* Say.

P. broquiartiana Lea = *exaenatus* Say.

P. buchananensis Lea = *exaenatus* Say (fide Simpson).

P. circumstriatus Tryon = *purrus* Say.

P. concavus Anth., M. S. = *purrus* Say.

P. costatus DeTarr & Beecher = *P. nantileus* var. *cristatus* Drap.

P. dilatus Hald. = *dilatatus* Gld.
P. elevatus Adams = *dilatatus* Gld.
Paludina hyalina Lea = *exacutus* Say.
P. lens Lea = *exacutus* Say.
P. lenticularis Lea = *exacutus* Say.
P. obliquus DeKay = *deflectus* Say.
P. planulatus Cooper = *opercularis* Gld.
P. umbilicatus Taylor (not Müll.) = *umbilicatellus* Cockerell.
P. vermicularis Gld. = *parrus* Say.
P. virens Adams = *dilatatus* Gld.

P. hirsutus Gld. differs from the European *albus* Müll. in having the hairs longer and in fewer rows.

P. costatus DeTarr & Beecher, never having been reported from any locality but Michigan, is very likely introduced specimens of *P. nautilus* var. *eristatus* Drap., with which it seems identical.

P. alabamensis Pilsbry shows light spiral striations under a lens. In *P. sampsoni* Ancey, the spiral striation is quite distinct.

GENERAL NOTES.

WE have taken advantage of the mid-summer number when Conchologists, like everybody else, avoid all the desk-work they can, to insert an Index to the *Conchologist's Exchange*. This will afford malacologists an opportunity of ascertaining the contents of that periodical, now rare and out of print. We had hoped to reprint the *Exchange* in full, but a sufficient number of subscriptions has not been received to justify us in the outlay.

SEVERAL years ago I collected two young specimens of a delicate bivalve in a mud bank at Revere, Mass., and put them away labeled *Zirphaea crispata*. I lately discovered that they are *Pholas truncata*, which shell has not, to my knowledge, been previously reported from north of Cape Cod.—EDWARD W. ROPER.

MR. A. A. HINKLEY, who has been for some time in Rockford, Ill., has returned to DuBois, Ill.

THE Chicago Academy of Sciences has recently purchased of Mr. John Walton, of Rochester, his collection of *Cypraidæ*. It has also purchased one of the collections of California and Mazatlan shells, prepared by Dr. P. P. Carpenter, and numbering some 3000 species.

CURIOS CHINESE USE OF SHELL-FISH.—The Chinese have been students of the habits of animals for many thousand of years, and the influences of this study have manifested themselves in their art and their architecture, so much so, that one can readily recognize the common form of their animal life through its resemblances to the objects and pictures with which we are familiar.

One of the most interesting is what is known as the "joss-shell." Every one has noticed the pearly luster of the bivalves of our rivers and ponds, fresh-water mussels, they are called. These mussels are lined throughout with the same kind of material as the pearl-oyster, and, indeed, pearls of value are often to be found in them. In China and Japan, these mussels grow to great size, in the latter country being oftentimes seven to ten inches in length, and in China, fully as large as a small saucer. The shrewd Chinese are aware that the pearly nacre is a protection of the animal, which has thus the smoothest of substances against its sensitive skin, and they know also that any grain of dirt or roughness will be quickly coated with pearl if it should lie under the mantle. They therefore catch the animal, and oblige it to make such designs as they desire. These are usually little josses, images of some one of the Chinese Gods, which are formed in clay and slipped between the mantle and the shell of the mollusk. The latter, as soon as it is put into the water again, begins to cover the model with a coat of pearl, and at some time, when the process has been carried far enough, the animal is killed and the shells preserved with their pearly josses and sold as curiosities. They are, however, very rare in this country, being on exhibition only in a few of the larger museums. It is said that upwards of one thousand of the Chinese made their living by this industry, and that they will, on order, insert in the shells models of the initials of any one's name, which, after a wait of a year and a half, will be ready for delivery.—*The Happy Thought*, July 15, 1895.

PROF. GILBERT D. HARRIS, of Cornell University, has returned from a geological trip through Mississippi and Alabama, and is now spending two weeks at the Academy of Natural Sciences, studying the "Lea Collection" of Eocene fossils.

POLYGYRA CEREOLUS SANCTIJOHANNIS n. var. Shell having the characters given in Man. Conch. IX, p. 73 for *P. cereolus septemvolva*, but periphery pinched out into an excessively acute keel. It is extremely abundant along the middle St. Johns River, Fla., from the Lake George region to L. Monroe at Sanford. I have seen nothing like it from other parts of the State. The shell is very thin, having very little lime in its composition, never enough to give a whitish color.—*Pilsbry*.

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THE NAUTILUS.

VOL. IX.

OCTOBER, 1895.

No. 6

ON THE AUSTRALASIAN GUNDLACHIA.¹

BY C. HEDLEY, F.L.S.,
With note on American forms

BY H. A. PILSBRY.

The eccentric shell of *Gundlachia*, one part shaped like a knife-sheath, or rather a spectacle-case, plastered askew upon another part like the shell of an ordinary fresh-water limpet, the creature's external likeness and internal unlikeness to *Ancylus*, and the remarkable, discontinuous, geographical distribution of the genus, combine to tempt a naturalist's curiosity. For a chance to satisfy such curiosity I am indebted to several friends who have liberally assisted me with all the material and information at their command, and without whose kindly aid I should have had to relinquish, unprofited, the study of the subject. Prof. Tate has kindly loaned me the actual types of *G. petterdi*, and given me examples of that species collected by himself at Mt. Lofty near Adelaide, S. Australia. Mr. W. F. Petterd has liberally communicated a large series of *Gundlachia*, including the actual type of his species *G. beddomei*. Mr. C. E. Beddome has supplied me with a collection of *Gundlachia* from various localities. Mr. H. Suter has convinced

¹ From Vol. VIII (Series 2nd) of the "Proceedings of the Linnean Society of New South Wales" (November 29th, 1893). We have omitted Mr. Hedley's descriptions of the Australian species of *Gundlachia* and his plate illustrating them.—ED.

me of the method by which the primary shell is transformed into the adult by presenting me with a series showing the passage from stage to stage collected by him in New Zealand. To Mr. R. H. Pulleine, of the Adelaide University, who guided me to the spot and procured me several specimens, I am particularly obliged for the pleasure of viewing *Gundlachia* alive at Henley Beach near Adelaide.

The genus *Gundlachia* was instituted by Pfeiffer in the *Zeits. Malak.*, vii, 1849, p. 98, for the reception of immature specimens of *G. uncyliformis* Pfr., sent to him by his correspondent, Dr. J. Gundlach, from Cardenas in Cuba. Troschel supplemented his friend's description by an account of an animal which had dried in the shell. From the dentition he classed the puzzle, not, as Pfeiffer was inclined to do, with *Naricella* and *Neritina*, but with its real kin the Limnaeidae. Though not recognizing it as such, he distinguished the jaw as a brown, semitransparent arch, convex in front and extending from eye to eye. Further remittances from Gundlach enabled Pfeiffer to describe and figure (*op. cit.* 1852, p. 180, pl. I, ff. 1-16) the adult and immature shells and to add some information from the collector of its habits and appearance when alive. From this species Bourguignat carved (Speicil. Malac., 1862, pp. 82-87) a new genus, *Poeyia*, type *P. gundlachiodes*, and two other species, *G. adelosia* and *G. poeyi*; all of which, so Crosse tells us (Journ. de Conch., xxx, 1890, p. 262), are but stages in the development of *G. uncyliformis*.

In Trinidad the genus occurred to Guppy in the form described by him (Proc. Sci. Assoc. Trinidad, Dec., 1872) as *G. crepidulina*, and figured Am. Journ. Conech., vi, 1870, pl. xvii, ff. 10 and 11.

From Mexico the genus is doubtfully indicated by Gibbons (Journ. of Conch., iii, p. 267).

An undetermined species was recorded (Am. Journ. Sci. (3), xxiii, p. 248) by Cook from the State of New York.

On the banks of the Potomac River Stimpson discovered *G. meekiana*, which he figured and described (Proc. Boston Soc. Nat. Hist., 1863, p. 249). This account, the best of the genus that has appeared, was transferred by W. G. Binney to the pages of "The Land and Freshwater Shells of North America," Pt. ii.

In California the genus is represented by *G. californica* Rowell, whose description is also reprinted, with additional figures, by Binney, from the Proc. Cal. Acad. Nat. Sci., 1863, iii, p. 21.

As a fossil, *Gundlachia* occurs in S. Carolina in a quaternary marl containing mastodon bones (Cook, *l. c.*).

[In addition to the records of *Gundlachia* in North America, compiled by Mr. Hedley, we may instance the finding of numerous specimens in ponds near Greenport, Long Island, N. Y., by Mr. Sanderson Smith, recorded in the Annals of the Lyceum of Nat. Hist. of N. Y., ix, 1870, fig. 6. The specimens differ sufficiently from *G. meekiana* to be considered by Smith a distinct species, which he names *G. stimpsoniana*.

A *Gundlachia*, closely allied to, if not identical with, *G. meekiana*,

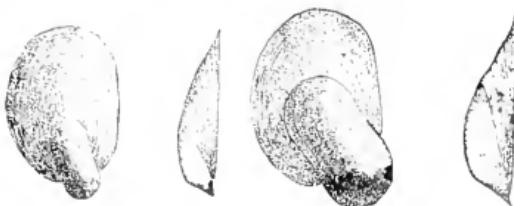


Fig. 1. *Gundlachia* from Rock Island.
Fig. 2.

occurs abundantly in a lily-covered pond near Rock Island, Illinois. Specimens are drawn in the illustrations here given (figs. 1, 2), fig. 1 representing a shell with small accessory cap, the other figure showing one with it large. All intermediate sizes occur. With these, are found numerous specimens of like asymmetrical contour, but lacking the accessory shell! These are, as far as the shells are concerned, merely *Aucylus*. They live with the true *Gundlachias* on the lower surfaces of the lily-pads, grazing on their watery pasture like little sheep dotting a hillside. Professor B. Shimek has found something very similar to these near Lincoln, Nebraska (see NAUTILUS, August, 1890, p. 48).

Still another record of *Gundlachia* is given by Dr. Victor Sterki, who found it at New Philadelphia, Ohio (see NAUTILUS, Jan., 1895, p. 107).—[*Pilsbry*].

Boettger has ventured to name an immature fossil from the Mayence Basin—*G. francofurtana* (Fischer's Manuel, p. 505).

A defective monograph of the genus, by Clessin, appeared in 1882 in the Conehylien Cabinet, Bd. i, Abth., 6, pp. 1-5.

The existence of this genus in Australasia was first announced by R. M. Johnston, who, in March, 1877, laid before the Royal Society of Tasmania an account of *G. petterdi*, from the vicinity of Launces-

ton in North Tasmania. In the first of two plates attached to "Critical Observations on Recent Contributions to our Knowledge of the Fresh-Water Shells of Tasmania," Pt. i, Proc. Roy. Soc. Tasmania, 1888, p. 84, but which Mr. Johnston, perhaps critically omitted to number or explain, are drawings 2a, 2b, 2c, presumably of this species. Appended to this paper is a table in which, under "General Remarks," a *Gundlachia beddomei* is mentioned as described "since 1881" by Petterd, which form is asserted to be "undistinguishable from *Gundlachia petterdi*." I believe that I am correct in stating that no species has ever been described under this title. The Quarterly Journal of Conchology contains, in Vol. iv, p. 150, a notice of a new and nameless molluse by W. F. Petterd, dated Nov., 1883, and evidently relating to the form written of by Johnston.

Prof. Tate recorded (Proc. Roy. Soc. Tasmania, 1884, p. 216) *G. petterdi* from the hill streams of the Mount Lofty Ranges near Adelaide.

Finally, in a paper I have had the honor of communicating to you this evening, Suter declares the existence of an undetermined and probably new species from New Zealand.

The broken range of *Gundlachia* has attracted the attention of several conchologists: Petterd (Journ. of Conch., i, p. 399), Fischer (Manuel, p. 251), Tate (Rep. Austr. Assoc. Adv. Sci., 1887, p. 325), Spencer (*op. cit.* 1892, p. 96), and Suter (N. Z. Journ. Sci. iii, p. 252) have each commented thereon. The fluviatile mollusca of Southern Australia have, strange to say, a stronger likeness to those of New Zealand than to those of the northern part of this continent. *Amphipeplus*, *Potamopyrgus* and *Gundlachia* are confined to Tasmania and to the south-east fringe of Australia; they all reappear in New Zealand, but the *Vivipara* and *Melania* characteristic of tropical and subtropical Australia have failed to accompany them there. The extension of *Potamopyrgus*, *Gundlachia*, and, according to Tate, perhaps *Amnicola*, with another Australian genus, *Myctopus*, to America is even more remarkable.

To explain similar instances, Mr. H. O. Forbes (to whose courtesy I am indebted for a copy of this very interesting paper) has lately revived the theory of an Antarctic continent, and supports it by several weighty arguments, notably the presence in the Patagonian Eocene of marsupial remains nearest allied to those now existing in Australia. A strip of land, with a mild climate, extending across the Pole from Tasmania to Tierra del Fuego, would have afforded a

possible route² for the migration from America to Australia of these Tertiary marsupials. But such a land could not have been connected with New Zealand, or the marsupials would have wandered there also. A great southward extension of Tertiary New Zealand, considered probable by Sir J. Hector,³ would, however, have availed to people the latter with much of the fauna and flora of the supposed Antarctic land, in the way that European plants are believed to have reached the Azores.

This theory of the origin of Australian marsupials would also account for the discontinuous distribution of *Gundlachia*.

The Australasian members of the genus known are *G. petterdi* Johnston, *G. beddomei* Petterd, MS., and *G. sp.* undetermined, and probably new, from New Zealand.

At present *G. petterdi* appears to be known, as adult, from only three localities: a small, shallow, stagnant pool near the First Basin, South Esk River, Launceston, Tasmania (Johnston and Petterd); a hill stream at Mt. Lofty, S. A. (Tate), and a chain of shallow, stagnant ponds behind the sandhills at Henley Beach, near Adelaide, S. A. (Adecock, Pulleine and Hedley). In this latter locality they were associated with *Planorbis*, *Bulinus* and *Aneulus*, the latter only determined by the shell. Their habit was to cling to drowned leaves and sticks, or to the submerged leaves and stems of water plants. So closely do they resemble *Aneulus* that a careful observer may, in the field, easily mistake one for another.

The precise mode of the growth of the shell does not seem to have been related by any writer. Johnston says (Proc. Roy. Soc. Tas-

² Had the alternative route advocated ("Island Life," 2nd ed. p. 497) by Wallace, "over what is now the Java Sea," been used by the marsupials, then Timor and the South-Eastern Austro-Malayan Islands should, as Forbes logically remarks, have preserved some remnants of the migrants amid surroundings so like Australia (Vol. iii, p. 22, Supplementary Papers, Royal Geographical Society, 1893). Spencer has demonstrated (Rep. Aust. Assoc. Adv. Sci., 1892, p. 118) "that the diprotodonts had their origin in the Eumelotian region," which also seems to me, though not to him, to indicate the south rather than the north-west as the point of marsupial ingress into Australia. In his latest paper Prof. Zittel says (Geol. Mag., Nov., 1893, Vol. x, p. 512): "For its [i.e., Australia's] connection at one time with South America, the abundant occurrence of fossil marsupials in the Santa-Cruz beds of Patagonia is valid evidence." See also Lydekker, "Nature," May 5, 1892, Vol. xlvi, pp. 11-12.

³ Address to the Geological Section of the Aust. Assoc. Adv. Sci., Adelaide, 1893.

mania, 1878, p. 24): "In the young state the shell is simple and resembles the common *Ancylus* in the same neighborhood."

From the fact that *Ancylus woodsi* (*op. cit.* p. 23) is omitted by its author from his last catalogue (*op. cit.* 1890, p. 145) I infer that he now considers that name to be a synonym, and further that he considers it a synonym of *G. petterdi*. If so, it is a matter for regret that Mr. Johnston has withdrawn his species in a manner to confuse a student of his writings.

The published figures of the juvenile shell only represent the stage at which the septum is completed and the secondary growth is about to occur. Thanks to a series of specimens collected by Mr. Suter in New Zealand, which probably represent the fry of an undescribed species, I am enabled to detail the process. My friend supposes that in unfavorable circumstances a septum is never formed, a view which his American experience had already suggested to Gibbons. If this be the case, and *Gundlachia* sometimes continues to regularly enlarge the ancyliiform shell, then only an anatomical examination could distinguish between the genera; and, although several supposed species have been named, and more or less adequately described as Australian, yet this hypothesis would require proof of the existence of *Ancylus* in Australia.

The first deviation shown by young *Gundlachia* from *Ancylus* consists of a fold appearing at the posterior end of the aperture. No increase occurs round the rim of the ancyliiform shell until the fold is built into a septum flooring half or two-thirds of the original shell. This septum is flat and grows asymmetrically, the right margin advancing before the left. At this stage the shell has much resemblance to a spectacle-case, and has been well figured by Pfeiffer. Vigorous growth now occurs; in front, but in an altered plane, the margin of the ancyliiform shell is continued outwards, behind, the shell is spread beneath the septum floor to form the roof of the secondary shell, then leaving the septum it is abruptly bent downwards. A slight inclination to spiral growth is shown by the increase on the right exceeding that on the left.

Stimpson suggests "that the *Gundlachia* commences its life as an *Ancylus*. . . . it passes the first summer and autumn of its existence in this smaller shell, and that the septum, which afterwards partially closes its aperture, is formed during the period of inaction which ensues during the winter. This septum would, in some degree, serve as a protection to the molluse during this period, in the

same way as the epiphragm of the *Helices*. In the following spring—the period of greatest activity in growth with all the fresh-water Pulmonates—the animal throws forth its newer and larger shell, retaining the older one on its back for the protection of its more tender viscera."

I regret that I can give but a meagre account of the soft parts. My only material was some specimens procured at Adelaide, which died on the voyage to Sydney, and were hastily and badly preserved on board the steamer. * * * Part of the liver and the hermaphrodite gland are pinched off into a sort of tail, which occupies the primary shell. With this exception, as Gundlach and other observers have remarked, there is no difference from *Ancylus*. The form and disposal of the stomach and intestines seemed, as well as I could ascertain, to agree with those of *Ancylus* figured by Moquin-Tandon.

Jaw extremely minute and frail, about $\frac{1}{4}$ the length of the radula, very narrow, composed of a great number of separate imbricating plates, which appear to be arranged two deep, in contact but unattached; each is oblong in shape and serrate at one end, resembling somewhat the scales on some butterflies' wings.

The difficulty of observing this tender and incoherent organ will account for the uncertainty that prevails regarding it. Troschel saw it, described it, and then unfortunately concluded that it was a piece of hardened skin. Stimpson failed to find it. Johnston noticed it in *G. petterdi*. In *Latia* Hutton asserts (Trans. N. Z. Inst., XIV, p. 156) that no jaw exists; it has more probably been overlooked.

Radula a narrow parallelogram, very small, measuring about 3×1 hundredths of an inch. Formula, 70 rows of 8:12:1:12:8. Each half row straight, meeting at a low angle in the centre. Rachidian with a long, slender basal plate, rounded and slightly expanded posteriorly; reflection about a fifth of total length, bicupid. Laterals with broad basal plates, emarginate at the proximal posterior corner, sloping away from the rachidian, reflection somewhat pyriform, the wide end proximal, set aslant on the basal plate and armed with a large proximal and two minor distal cups. Marginals more upright, with reflection of same pattern, but extending almost the length of the basal plate.

CONCLUSION.—The genus *Gundlachia* contains four American—*G. ancyloformis*, *meekiana*, *californica*, *crepidulina*—and two Aus-

tralian species—*G. petterdi* and *beddomei*. It is nearly allied to *Aneylus*, from which it differs anatomically by a distinct pattern of radula, and conchologically by its compound shell. The existence, variously affirmed and denied, of a jaw, is now demonstrated by figures. It has been suggested, but not proved, that in unfavorable circumstances the shell never attains its compound development, but remains simple. From an *Aneylus* of the same size the subcentral nucleus and regular elliptical outline distinguish young *Gundlachia*.

A fuller knowledge of the development and structure of the genus is very desirable.

The nearest, in phylogenetic array, to *Gundlachia* are probably the New Zealand *Latia* and the Tasmanian *Aucylastrum*. Should Hutton's *Latiida* win acceptance, which seems doubtful, it might include these.

The distribution of *Gundlachia* agrees in part with that of the recent marsupials, and the theory of a Mesozoic or older Tertiary migration to or from Australia across the south pole, when a lost land with a mild climate united Tierra del Fuego to Tasmania, would explain its present position.

A NEW MEXICAN BYTHINELLA.

BY HENRY A. PILSBRY.

Bythinella palomasensis.

Shell small, ovate, rapidly tapering above from the periphery of body-whorl to a blunt apex; composed of four very convex whorls, the last about five-sixths the entire length of the shell, well rounded out. Surface showing faint growth-wrinkles only. Aperture ovate, subangular above, its longest axis about half the length of the shell; peristome thin, continuous across the parietal wall and nearly straight there, although not appressed to the body-whorl. Umbilicus minutely perforated. Color whitish corneous and somewhat translucent.

Alt. 2.75, max. diam. 1.80 mm. Longer axis of aperture 1.36 mm.

Two specimens from Lake Palomas, northeastern Mexico, collected by Dr. E. A. Mearns, U. S. A., of the International Boundary Commission. One of the two specimens has the latter third of a

whorl free from the body, as in *Lyogyrus*, a somewhat common pathologic condition in species of this and allied genera; but in the other and evidently normal specimen the peristome is quite free from the adjacent body-whorl, not appressed thereto. Neither example retains the operculum or dried soft parts, and therefore the generic reference cannot be verified by examination of the dentition, but the figure of the shell is that of a *Bythinella* rather than of an *Amnicola*.

It is a stumpier species than *B. binneyi* Tryon, and has far less inflated whorls than *B. brevissima* Pils., but these two species are conchologically its nearest allies among United States species. Of the short-spired Mexican forms, *Amnicola orizabensis* C. & F. is totally diverse, although the figures in Crosse & Fischer's work (pl. 50, fig. 4, *a, b*) look somewhat like this species. *A. guatemalensis* C. & F. is larger, with relatively smaller aperture.

ISAAC LEA DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

Every week the General Secretary receives letters from the members of the Chapter telling of the benefits of Chapter membership.

A good rule to follow in exchanging specimens is this: "Give a little more than you receive." The one who exchanges merely to add to the number of shells in his own cabinet, loses one of the great pleasures in life--the blessedness of giving pleasure to others.

NOTES ON SHELLS.

[Report of Mrs. E. C. Soper. From the Transactions of the Isaac Lea Conchological Chapter of the Agassiz Association for 1894.]

My enjoyment in studying shells is greatly lessened by the fact that to obtain good specimens I must collect those that are "alive," and then go through the intensely disagreeable operation of killing the helpless animals. Though, as we are told, they are not so sensitive to pain as the higher organisms, yet the poor, writhing, quivering creatures appeal to my pity in a very great degree.

However, men's cruelty, perhaps, does not surpass or equal that of the winds and the waves, and of the stronger animals that prey upon

the weaker; but, until I overcome my repugnance to the killing and dissecting of molluscs, I shall take more enjoyment in studying their homes than in getting acquainted with the inmates themselves.

Being a new member of this Society, and also a novice in conchological lore, I can hardly hope to write anything of much interest to the older members, but, perhaps, the younger ones may care to hear about some of my most interesting (to me) "finds." * * * * I shall never forget an expedition, taken in the early part of this year ('94), to Long Beach, in company with a friend, when our enthusiasm for collecting had just begun. Leaving Long Beach a short time before noon, we started to walk to Alamitos Bay, neither of us knowing the distance. We picked up so many shells that, before we were half way there, we were very tired; but determined to reach our destination, we pressed on, were caught in a shower, and finally reached the bay more dead than alive, judging from our feelings. We found nothing very valuable, but we fairly staggered under the load of shells we carried home, which place we did not reach until after dark. We were told the distance was five miles each way, and we believed it.

Last summer, during a trip taken with the Chatauqua Assembly School in Conchology, I picked up a shell near a fisherman's cottage on Tim Point, which proved to be a small specimen of *Siphonalia kelletti* Fbs. While cleaning it, I noticed, about two inches from the lip, on the inside, a rusty looking spot, through which the water trickled. After using quite a quantity of acid to take off the accumulation of foreign matter on the outside which nearly hid the form of the shell, I discovered opposite the rusty spot, and imbedded in the hard shell, a tiny mussel, half an inch long. I thought I had made a discovery; but, alas! on turning to "West Coast Shells," I found that these little mussels grow sometimes in large shells. I think it is *Adula stylina* Cpr., but so small and delicate! How did it carve a home to fit it so perfectly?

I have taken a good deal of pleasure in rude attempts to draw and paint some of the more simply formed shells, but I find it is difficult to reproduce them faithfully.

When in San Francisco, I had the privilege of a day in the Academy of Sciences, of looking at Tryon's magnificent work, which was beautifully illustrated in colors. I also had the pleasure of visiting Mill's College and the University at Berkeley, and of seeing the collections of shells at both these institutions, and I shall

always remember the courtesy shown to me, and the kindly interest taken in my growing desire to know something about conchology by those who have long made it a study.

MRS. MARY P. DARLING has collected, at the various beaches in Los Angeles County, and reports "one hundred and eighty-three species; among them are a live *Calliostoma splendens* and a dead *Nassa inaequalis*."

WITH A DREDGE.

[Report of Miss Ida M. Shepard. From the Transactions of the Isaac Lea Conchological Chapter of the Agassiz Association for 1894.]

I have added a number of specimens to my collection during the year, and had the pleasure of dredging in the bay, with very good results. It is with impatience we wait the dredge to fill, after dropping it over the stern of the boat; and when it comes up filled with mud how we watch and exclaim over some treasure we see as the mud is being washed out. But often we find nothing, and often many good and rare specimens. I will tell you of what a few dredges contained. After the dredge is pulled up and the mud washed out, the contents, if any, are dumped into the tub, and we look it over, and find nothing but a stone or two and a few *Olivella boeticus*, *Tornatina culcitella*, and young *Rictaxis punctocaelatus*. After the dredge was dropped over again, I picked up a small stone and looked it over, and soon gave an exclamation of delight, for, on one side, snugly in its nest, was a fine, large *Lima orientalis* Ad. & Rve. It did not take long to cut the nest from the stone and put it into a jar of sea-water, and before we reached the shore the Lima came out of the nest and swam around the jar. I wish I could give a good description of what a beauty it was swimming. Will do the best I can. About $\frac{2}{3}$ of the length of the shell the tentacles are of a bright rose color, the rest pure white, and, as it swam around, its beauty can be imagined. The tentacles are about $\frac{1}{4}$ inch in length. It would put out its foot at times to help it along.

Another dredge brought up a fine, large *Clidiophora punctata* Cpr., and it gave an exhibition after being put into a cup of sea-water and sand. Other dredges gave live *Dentalium hexagonum* Sby., *Scalpellum hindsii* Cpr., *Eulima mearnsi* Cpr., *Mangilia variegata*, *Turbonilla tridentata*, *Macoma yoldiformis*, and the pretty *Tellina variegata* Cpr.

Besides dredging comes the collecting of fine *Lunatia lewisii*, *Fissuridea aspersa*, *Acmora pelta* var. *hybrida*, *Acmora pelta* var. *nacelloides*, *Diplodonta orbella* and nests; *Lacuna carinata* and two finds of over 150 *Terebratella transversa*. Then dead specimens, in good condition, of *Caudulus fusiformis*, *Parthenia armata*, *Rissoina infrequens*, *Felania sericata*, with quantities of rich drift, not yet sorted, which doubtless contains many rare specimens new to my cabinet.

GENERAL NOTES.

MR. CHARLES W. JOHNSTON left Philadelphia, September 24, for an extended geological trip in the Eocene regions of Louisiana and Texas.

DR. WM. H. DALL has published a resumé of the results of his systematic studies on *Mactridae* and *Mesodesmatidae* in the last number of the Proc. Malacological Society of London.

PROF. GILBERT D. HARRIS has been spending some time in Philadelphia studying and remounting Lea's type collection of Claiborne Eocene fossils.

ACANTHOCHITES MATTHEWSI *Bednall & Pilsbry*, described in THE NAUTILUS for February, 1894, from "South Australia," was found by me in St. Vincent's Gulf at Giles' Point, south Yorke's Peninsula, at an unusually low tide.—*E. H. Matthews*.

EPIPHRAGMOPHORA CALIFORNIENSIS VAR. CONTRACOSTÆ.—Smaller than var. *diablocensis*, but of the same depressed form; light yellowish straw-colored, with or without a dark band; surface rudely striate and cut by irregular spirals into small granules; not malleated or slightly so. Whorls $5\frac{1}{2}$; outer lip thickened, hardly expanded, white, basal lip expanded and a trifle impinging on umbilicus, which is deep and rather widely open, somewhat as in *Polygyra kiawensis*. Locality, Byron Hot Springs, Contra Costa Co., California.—*Pilsbry*.

EPIPHRAGMOPHORA REMONDI Tryon.—This species is, as Cooper and von Martens have lately recognized, quite distinct from *carpenteri*. Ancey's *H. verrilli* (Conch. Exch.) is a synonym of Tryon's species, Ancey having been misled by the misidentification of *Rémondii*, which has prevailed since the publication by Gabb of his Lower California finds.—*Pilsbry*.

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No. 7

ON DOLABELLA CALIFORNICA STEARNS.

BY HENRY A. PILSBRY.

The genus *Dolabella* has long been known as an inhabitant of the Indian Ocean and Polynesia, but it had not been reported from American waters until Sowerby described the shell of *D. guayaquilensis*, from Guayaquil, in 1868.

In 1879 Dr. R. E. C. STEARNS described a *D. californica* from Mulege Bay, Gulf of California, but unfortunately the shells only were available for his study. They were found by Mr. W. J. Fisher "in pools left by the tide" at the locality named.

Part of the specimens collected by Fisher were secured by Mr. W. N. Lockington, and presented to the Academy, in alcohol; so I am enabled to give below a description of the animal of this interesting addition to the West Coast fauna, which proves to be nearest allied to *A. tongana* and *ecaudata*, Polynesian species.

The dentition of *Dolabella* is excessively peculiar, and together with the unusual position of the genital orifice, necessitates the formation of a new subfamily, *Dolabellinæ*, for this genus.

D. californica Stearns.

Description of alcoholic specimens:—Length 12 to 14 cm. Oblong-ovate, broadly rounded behind, Aplysia-like in front. Buccal tentacles ear-like, short and folded about at the middle, not produced toward the mouth; tentacles conic and slit; the very minute

eyes in front of them and more separated. Mouth a vertical slit in a papillose disk. Swimming lobes arising at or behind the middle of the animal's length, contiguous. Posterior subcircular area defined by a groove with smooth, raised anterior edge, and enclosing a cord. Mantle having a large shell-foramen and a long posterior siphonal fold. Genital orifice under the back part of the gill.

Color (in alcohol) dark olive, or dull brown with more or less black maculation. In life it is said to be "a dark brown and the surface covered with warty papillæ."

Shell solid, with a brown cuticle. Apex with a roughened reflexed callus, continuing along the dorsal margins as a reflexed border over the cuticle.

In external appearance, this species seems nearest to *D. ecuadorensis* and *tongana*, but the posterior area is defined by a far less conspicuous frill, which does not extend to the edges of the dorsal slit. *Dolabella guayaquilensis*, a species known by the shell only, is stated to have the margins "scarcely reflected, callus small, narrow, not continued upon the margins," while in the present species the margins are bounded by unusually broad reflexed callous bands. Traces of sparsely scattered wart-like papillæ are visible on some specimens, mainly posteriorly, but these are not very distinct in the alcoholic examples. Two of the original lot collected by Fisher are before me, the smaller one being drawn in my figure, and another specimen of a dark olive color collected by Dr. W. H. Jones on the "West coast of Mexico," has also been examined.

DESCRIPTIONS OF NEW PISIDIA.

BY DR. V. STERK.

In looking over more than 20,000 specimens of *Pisidium*, during the last twelve months, the writer came across numerous new forms, and many of them will prove to be new species. But, as some of those already published are not fixed beyond a doubt, owing to insufficient descriptions and figures, and lack of reliable originals, and as new forms are constantly coming in, it will be advisable not to hurry with publications. Yet a few of these new species were seen from so many different places, and come to hand again and again that it is too unsatisfactory to return them without or only with MS.

names. Besides, they are not doubtful species, being well defined and distributed over wide areas. Mr. E. W. Roper having examined specimens wished the writer to publish these species.

The descriptions will not be exhaustive, especially as to the hinges, leaving that, as well as figures, for a monograph, but they will be sufficient for recognition of the species.

P. WALKERI n. sp. Mussel of medium size, elongated, rather inflated, resembling *P. abditum*, but is smaller than good sized examples of that species; it is also more elongated, and the smaller and moderately prominent beaks are more posterior; thus the anterior part is comparatively very long, with the end rounded, the posterior quite short, truncated at the end; scutum and scutellum well marked. The shell is very thin, translucent, the surface very finely, and sharply striated, often somewhat scaly, dullish, or with a silky gloss; color grayish, along the margin more or less yellowish horn. Hinge moderately strong, of the same type as in *Pis. abditum*; cardinal tooth of the right valve moderately curved, its posterior part thickened and with a deep furrow; below this tooth, there is a deep groove formed by the inferior edge of the hinge list raised; and the same formation is in the left valve below the deep groove between the two cardinal teeth; ligament comparatively strong.

Long. 4·5, alt. 3·7, diam. 2·8 mill.

In outline, our species has some resemblance with *P. virginicum*, by its elongate shape, the beaks situated posteriorly, the long and below somewhat sacciform anterior part. But it is much smaller, its shell quite thin, the hinge finer, the striation finer and the beaks are much smaller.

P. walkeri is quite a characteristic and beautiful species which cannot be mistaken for any other. It has a wide geographical distribution but seems to live not in great numbers together, as e. g. *P. abditum*, *compressum* and others do. For the first time I found it in a lot of *Pisidia* from Kent County, Michigan, in the collection of Mr. Bryant Walker—in whose honor it has been named—, and in another from Utica, Mich. Later it was seen from Grand Rapids, Mich. (L. H. Streng), Columbia, Pa. (Bryant Walker), Mohawk, N. Y. (in E. W. Roper's collection, from E. R. Mayo); Clearwater and Mississippi rivers, Minn. (H. E. Sargent).

P. POLITUM n. sp. Mussel of medium size, well inflated, rather high, beaks slightly posterior, rather high and prominent, not full but well rounded; scutum and scutellum slightly marked. Super-

rior margin rather short, rather strongly curved; inferior well curved, more so in front than behind; posterior margin distinctly truncated, with a well marked angle where joining the superior, and a less marked, rounded angle where joining the inferior margin; anterior end forming a slight but distinct angle situated rather high up. Surface very finely, irregularly striated, polished; whitish or straw colored, often leaden-grayish on the beaks, or even all over. Shell moderately thick, nacre whitish; muscular insertions not very distinct; hinge of essentially the same type as that in *Pis. abditum*.

Long. 4·0, alt. 3·4, diam. 2·4 mill.; 4·7 : 4·0 : 2·9 mill. from another place.

Pis. politum is rather variable in size, and more so in color as noted above, but so markedly constant in its several habitats that a number of different local forms, or varieties could be described. It has some resemblance with *Pis. abditum* Hald. and *Pis. variabile* Pr.; from the former it is different by its being somewhat smaller, comparatively shorter and higher, the beaks being less full, the surface finer striated and more polished; from the latter it is distinguished by its smaller size, the beaks being less full, the antero-superior margin less straight, and the angle at the anterior end being situated higher up; the shell is thinner and the hinge less strong, the coloration different. With all these differences appearing only gradual, our *Pisidium* is a good species beyond a doubt and will always be recognized.

It was found, in May a. e., in the outlet of a small peaty swamp near New Philadelphia, Ohio, about 200 specimens, in company with *Pis. abditum*, *varibile* and *compressum*, all, when fresh, being of a remarkably uniform color and appearance; Philadelphia, Pa. (Morris Schieck); Grand Rapids, Mich. (L. H. Streng); Joliet, Ill. (Jas. H. Ferriss); Clearwater River, and Dallas Lake, Minn. (H. E. Sargent).

P. milium Held. This is not a new species, but new to our country. A number of specimens from East Twin Lake, at Charlevoix, Michigan, dead shells but in perfect condition, in the collection of Mr. Bryant Walker, were, after careful comparison, found to be congruent, in shape and appearance, as well as in the hinge characters, with one of the larger forms of *Pis. milium* from England, so that there can be no doubt in their identity.

New Philadelphia, Ohio, Oct., 1895.

EDITORIAL CORRESPONDENCE.

*Natchitoches, Louisiana.**October 6, 1895.*

My first work was two miles below Mabelvale (12 miles southwest of Little Rock, Arkansas) along Fourche creek; an outcrop of Eocene limestone of the Midway or Clayton stage occurs here, containing *Enclimatoceras ulrichi*, *Ostrea pulaskensis*, *Cucullea microdonta*, *Cytherea* sp., *Venericardia planicosta*, etc., etc. Most of the fossils consist of casts only, and are difficult to obtain from the hard limestone. The situation was very favorable for land shells, however, and the heavy rain of the day before had caused the snails to start from their hiding places and I found them very abundant, crawling over the rocks and leaves. *Helicina orbiculata*, *Polygyra thyroides* var. *bucculenta*, *Polygyra inflecta* and large fine specimens of *Zonites friabilis* were particularly common, while a search brought to light *Polygyra stenotrema*, *Polygyra divesta*, *Selenites concava*, and *Pyramidula alternata* var. *mordax*. The whole bluff was strewn with dead shells, and in turning over a log one of the enemies of the Helices was found, a large beetle of the genus *Cyclus*.

At White Bluff on the Arkansas River, in Jefferson Co., Arkansas, is a bed of Upper Claiborne. The principal fossils collected were *Venericardia planicosta*, *Nucula ovula*, *Cytherea discoidalis*, *Corbula nasuta*, *C. oniscus*, *Turritella arenicola* var. *branneri*, *Turritella clevelandia*, *Pseudoliva retusa*, *Levifusus branneri*, *Volutilithes petrosus*, *Solarium bellastriatum*, a fine series of *Mazzalina inanaria*, and many others, altogether probably 25 or 30 species.

At Vincee Bluff on the Saline River in Cleveland Co., Arkansas, is a small exposure of the Jackson bed from which about thirty species were obtained. The river was very low and in many places paved with Unios. As it was getting late, and a drive of eleven miles was before me I had very little time to collect; but upon cleaning the "catch" next morning, found I had the following species: *Unio pyramidatus*, *U. crassidens* (*), *U. trigonus*, *U. camelus*, *U. turgidus*, *U. pustulosus*, *U. near castaneus*, *U. plicatus*, *U. cornutus*, *U. metanever*, *U. trapezoides*, *U. securis*, *U. hydeanus*, *U. aberti*, *U. tuberculatus*, *U. near satur*, *U. gracilis*, *U. purpuratus*. The first five species were abundant and many of the others would prove equally so with more thorough collecting. It is an ideal spot for a "Uniologist." *Campeloma subsolidum* Anth. and *Ileurocera elevatum* were also abundant, and among the former I find one specimen of *Vivipara subpurpurea* Say.

My next collecting was done at Mt. Lebanon, Bienville Parish, Louisiana. This is the locality discovered by Mr. T. Wayland Vaughan, and through his kindness in giving me the exact position of the bed, I was able to find it, after considerable digging, as the banks had caved down. I succeeded in getting a very interesting lot of fossils, including fine specimens of *Anomia ephippoides*.

While waiting for a train at Shreveport I took a stroll along the Red River and a small tributary ("Lake") to the north of the city. Nothing was to be found along the river except quantities of dead Helices, etc. among the flood-debris, but which have practically no value, as their habitat may have been Arkansas, Texas, or Indian Territory. Along the shores of the "Lake" I found some beautiful specimens of *Unio alatus* and *U. anodontoides*; and *Campeloma sub-solidum* and *Viripara subpurpurea* were quite plentiful. Although the Red River was extremely low, the ever-changing bars and the freshet-swept shores are unfavorable situations for mollusca; while in the smaller rivers and tributaries they are abundant.

CHARLES W. JOHNSON.

NOTE ON THE GENUS JOANNISIA.

BY W. H. DALL.

In the Transactions of the Wagner Free Institute of Science vol. III, p. 545, April, 1895, I proposed the name of *Joannisia* for *Cyrenella oblonga* Sowerby and another Philippine island species which had been referred to *Cyrenella* (or *Cyrenoida* Joannis) as the hinge of these species is quite different from that of the original type of *Cyrenella* (or *Cyrenoida*). The Marquis de Monterosato kindly calls my attention to the fact that in 1888 he had used the name *Joannisia* for a genus typified by *Tylodina citrina* Joannis (Nom. Gen. Con. Medit., p. 149).

I would therefore modify the name as applied to the Philippine bivalve to *Joannisella*.

ISAAC LEA DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

Before the November issue of THE NAUTILUS each member of Chapter will have received a copy of our new printed list of members. A number of new names appear upon the list.

Please bear in mind that our Chapter reports are due next month (December). It is expected that our volume of Transactions will be very large this year. Write only on one side of paper eight by ten inches in size. Leave a margin of one and one-half inches at the left. Every member is expected to send in a report. A short one will be better than none.

The election of officers for the Chapter also occurs in December. The President and General Secretary, who also acts as Treasurer, are the officers to be elected. Those who have not paid dues in advance will please bear them in mind.

RAISING BABY SNAILS.

[From the Transactions of the Isaac Lea Conchological Chapter.]

Prof. Keep once inquired, in the *Popular Science News*, "Did any one ever raise baby snails?" I copy from an old note book:

"May 24, 1886, *Mesodon thyroides* deposited forty-three eggs. All hatched between 4 P. M., June 8 and noon June 9. June 23 found fifty-seven eggs." They were in two nests, and I probably removed the mother before her day's work was done, as I found fourteen more immediately after, making seventy-one. "July 11, sixty-nine. July 20, forty-seven." Whole number deposited in four days less than two months by one snail, 230.

Those hatched June 8 show, on July 1, small umbilicus, $2\frac{1}{2}$ whorls, and on July 8, three full whorls. July 23, four whorls, umbilicus partly covered. Shell so thin it is almost impossible to handle.

The following January, nearly five whorls, lip thickening and slightly everted. Callous on the body-whorl, but no tooth.

If any one interested in the study of mollusca could raise young, from any or all species in their vicinity, it would not only be instructive, but would save time and patience, when an undeveloped shell is found, in trying to find out what it is. The tiny youngsters have sometimes very little resemblance to an old one. I am rarely without one or two colonies.

MY FIRST YEAR COLLECTING AND STUDYING SHELLS.

[Report of H. Lowe. From the Transactions of the Isaac Lea Conchological Chapter of the Agassiz Association for 1894.]

My knowledge of collecting shells is quite limited as I have only studied conchology for about a year. I have collected chiefly at Long Beach and San Pedro, but prefer the latter place for collecting as it offers a great variety of beach, rocks, sand and mud flats. At Dead Man's Id. are to be found rock shells in abundance, the *Chlorostoma*, *Monoceros*, and *Littorina* clinging in dark patches on the rocks of the breakwater, while among them are bright red starfish and Chitons.

The *Pomaulax undosus* are also plentiful, for at one time I picked up thirty-five living specimens in one place. On the great pieces of kelp which are seen floating in the tide pools, are often found colonies of the beautiful *Norrisia norrisii* with their strawberry colored bodies extended from the shell.

I have found beautiful live specimens of *Semele decisa* in sand between the rocks on the Bay side of Dead Man's Id. and good specimens of the *Cordium quadriogenarium* in the mud flats. *Olivella biplicata* may be found at low tide between Rattlesnake Id. and Terminal Id.

Most of the shells of Alamitos Bay are bivalve, while those of San Pedro and Dead Man's Id. are mostly Gastropods.

This Summer *Neverita reclusiana* has been quite plentiful for I found one hundred and twenty-five in one morning at the Donax beds at Long Beach, and I found it quite true as Prof. Keep says, that the *Natica* eat clams for I caught them while boring into Donaces. * * * * * Among other interesting relies which I found this Summer was the house which the *Oedalina subdiaphana* Desh., builds. It is made of sand and some substance which holds the sand together and covers the shell completely except for two tiny holes left for the siphons. It is about an inch long, and may sometimes be seen lying on the mud flats at Alamitos Bay, and resembles lumps of sand. The shell of the little mollusk which lives inside is pure white and very delicate, the lines of growth are distinct and the ligament is internal.

You may have wondered in walking along the beach, what the curious formation of sand, looking like a horse's hoof was. By some

people they are called "sand dollars." I was greatly puzzled over them till this summer when I learned, at the Conchology Class of the Chautauqua Assembly what they were. They are the egg cases of the *Natica* and are full of microscopic eggs mixed with the sand. Sometimes on top of the egg cases are found the eggs of the *Nassa* lying in long rows.

NOTICES OF NEW PUBLICATIONS.

ON THE STRUCTURE AND AFFINITIES OF SOME NEW SPECIES OF MOLLUSCS FROM BORNEO.—By W. E. Collinge and H. H. Godwin-Austen, P. Z. S., 1895.—This interesting paper gives descriptions and many figures of three new slugs collected by Mr. Everett in Borneo. The fact is brought out, that the slugs of Borneo resemble in their anatomy some of the shell-bearing forms of that island, rather than the Indian slugs to which they show more outward similarity. The first species is placed in *Damayantia* Issel, for all that it has a shell. The suggestion that Issel was mistaken in supposing that his genus was shell-less is probably correct; the present writer had in Ann. Mag. N. H., Jan., 1891, p. 100, suggested a doubt as to the validity of this character by quoting it within inverted commas. Some remarks are given as to *Tennentia*, which is said to be "probably synonymous with Issel's genus," but immediately below is correctly shown to be equivalent to *Mariaella*. It is probable that the authors meant to say that the so-called *Tennentia philippinensis* is a *Damayantia*, but not that *Tennentia*—*Mariaella* is *Damayantia*! If the latter synonymy held, *Mariaella* would of course be the name of the genus, having long priority. The statement that *Dekhania* G.-A. is the same as *Mariaella* and "must be suppressed" comes rather late in the day, since the present writer had suppressed it, with all due pomp and solemnity, in 1891 (t. c., p. 103-104), and again in the check-list of 1893. The other two species are placed in *Microparmurion*, a genus or subgenus lately instituted by Simroth for a species from Java. Curiously, in making comparisons, *Africarion pallens* is said to be from South India, whereas it was really from Abyssinia, vide Godwin-Austen, Moll. of India, 1883.

Simroth's division of the Javan slugs into *Furmurion* and *Microparmurion* may be justified, but a new name is apparently required

for what he calls *Parmarion*. If we admit that the Javan slugs are not *Gerasia* nor *Ibycus*, then they are assuredly not *Parmarion*; for that genus was founded by Fischer on four slugs, one of which is a *Mariella* one a *Gerasia* (Indian), one an *Ibycus* (Indian), and the other a *Hyalimax*!

In conclusion, we may cordially echo the author's wish that further Bornean material may be obtained by them, for they have certainly only obtained a glimpse of the undoubtedly rich slug-fauna of that region.—T. D. A. COCKERELL.

REVIEW OF OUR PRESENT KNOWLEDGE OF THE MOLLUSCAN FAUNA OF MICHIGAN, by Bryant Walker (address delivered before the Michigan Acad. Science, Dec. 27, 1894). Michigan has a long Malacological history, for a Western State, beginning with Dr. SAGER, in 1839, who had worthy followers in MILES, CURRIER and DeCAMP, successive historiographers of the rich mollusk-fauna of that great State. Other Michigan naturalists—MCNEIL, STRENG, LATHROP *et al.*—have made large additions to our knowledge of the mollusca, not to mention the Eastern authors Conrad, Anthony, Lea, Tryon and others, who described material collected by the ardent and enthusiastic band of Michigan naturalists. All of this is most interestingly related by Mr. WALKER, in this survey of the history of Michigan Malacology. In the notes accompanying his tabular enumeration of all species reported from the State, from all sources, (284 entries), much valuable information is given, but so condensed that no useful abstract is possible. A full bibliography of Michigan conchology concludes the paper.—H. A. P.

A CATALOGUE OF THE MARINE MOLLUSKS OF JAPAN has been issued by Messrs. Frederick Stearns and Henry A. Pilsbry. It is a handsome volume of 204 pp., and 11 plates. Suitable notice of the contents will be given next month.

MOLLUSQUES DE LA BASSE CALIFORNIE, recueillis par M. Dignet-déterminés par M. Jules Mabille (Bull. Soc. Philomathique de Paris, (8) vii, pp. 54-76, 1895). This annotated list comprises both marine and inland mollusks, and many supposed new species. In most cases exact localities are not given. The forms described or mentioned as new are: *Octopus digneti* Perrier & Rochebr.; *Fissurella (Cremides) pluridentata* and *digneti*, *Patella unigmatica*, *Crepidula nebulata* Mabille; *Pleurobranchus digneti* and *Doris umbrella* Rochebr.; *Planorbis mysurus*, *Helix indigena*, *steganella*, *inveeta*, *digneti*; *H. (Polgyyra) solidens*, *triangularis*; *Bulimulus (Lepto-*

byesus) lapidivagus, dentifer, subspirifer, dismenicus; B. (Seutalus) aeholus, cosmicus, eucotylus; B. (Thaumastus) digueti; B. (Globulus) recognitus; Bereudtia digueti, minorina; Barbatia nora, digueti; Perna recognita; Anomya [sic] simplex Mabille; Plicatula spondyllopsis, ostreivaga, Chama parasitica, digueti Rochebrune. The diagnoses are not accompanied by comparisons with known species, nor are figures given; and the work as a whole, instead of adding to our knowledge of Lower Californian conchology, quite appreciably darkens the subject. There are unquestionably some misidentifications, or possibly mixture of specimens from other localities, among the marine shells; and numerous typographical errors mar the paper. There should be a petition in the litany of all good conchologists against this sort of dilettante trash.

DE L'EXISTENCE DU GENRE BERTHELINIA CROSSE A L'EPOQUE ACTUELLE, par Ph. Dautzenberg (Bull. Soc. Zool. France 1895). In 1875 a peculiar, very small, *Cupulus*-like shell was discovered in the Paris Basin Eocene, and named by Crosse *Berthelinia elegans*. It was supposed to be a univalve; but later another was found, and proved to be a *left valve* of the species, which was then transferred to the bivalve family *Aciculidae*. The genus has also been surmised to be an embryonic bivalve, analogous to *Sinusigera* in Gastropoda. Now a living representative of *Berthelinia* has been found, and named by M. Dautzenberg *B. Schlumbergeri*, in honor of the discoverer. It is less than a millimeter long, white, with spiral beaks like *Isocardia cor*; the interior is not pearly, but mat, so that Cossmann is probably right in referring *Berthelinia* to *Prasinidae* rather than to the pearl oyster group. It was dredged in sand at the island Nossibé, near Madagascar.—H. A. P.

NOTES AND NEWS.

DR. WM. H. DALL, Honorary Curator of the Department of Mollusks, U. S. Nat. Mus., has returned from a prolonged sojourn in Alaska, where he has been engaged in an examination of the coal resources of the country.

MUSSELS IN A CITY RESERVOIR.—During the cleaning of the East Park Reservoir, 33d St. and Columbia Avenue, Philadelphia, Mr. J. E. Ives observed numerous *Unio complanatus* in the muddy sediment in course of removal. Specimens presented to the Academy of Natural Sciences by him are well-grown and normal. The water

supply of this reservoir is pumped from the Schuylkill, where this species is abundant; and it was doubtless introduced in the state of free-swimming embryos, which found in the muddy bottom of the reservoir, a suitable station.—*H. A. P.*

PYRAMIDULA ALTERNATA AND GASTRODONTA LIGERA, REVERSED.—In the collection of the late ROBERT WALTON, of Roxborough, Philadelphia, which was presented by his father to the Academy of Natural Sciences, a reversed specimen of each of these species occurs, both taken in the vicinity of Philadelphia. In a former issue we have announced a reversed *Z. cellarius* found by the same ardent conchologist.

Another sinistral specimen of *P. alternata* has been presented to the Academy, a finely developed shell of the size of ordinary adults in this locality. It was found by Mr. JOHN FORD in the West Park (Fairmount) some years ago, in a locality now destroyed so far as snails are concerned.

It would seem that sinistral individuals occur more frequently in *Pyramidula* (*Patula*) than in our other groups of American Helices. Binney records a reversed *alternata* (Man. Amer. L. Sh. p. 257) in the Museum of Comparative Zoology. I have seen a fine reversed specimen of *P. strigosa*, in the collection of the late Dr. FR. STEIN, of Indianapolis, Ind. I believe that no sinistral specimens of American species of this genus other than those mentioned above, have been put on record, but it is not unlikely that others exist in collections, unrecorded. If so, we would be pleased to hear from their possessors, and to record the occurrence of such sinistral Helices as may come to our knowledge.—EDS.

THE EDITOR has had the pleasure of very pleasant calls from DR. THEODORE GILL and PROF. A. E. VERRILL, whose attendance at the meeting of the National Academy of Sciences, of which they are distinguished members, brings them to this City of Brotherly Love.

CONCHOLOGISTS who do not already possess a copy of Tryon's "STRUCTURAL AND SYSTEMATIC CONCHOLOGY" should procure it now. This work is indispensable to the collector who wishes to gain an intelligent idea of the affinities or structure of shells, or to classify a collection. The plates illustrate thousands of species representing all of the genera and subgenera, and the text contains interesting chapters on geographical and geological distribution, structure, classification, etc. It is the most complete text book on the subject in the English language.

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NOTES OF A CONCHOLOGIST IN JAPAN.

BY JOHN B. HENDERSON, WASHINGTON, D. C.

It was my good fortune to accompany the Hon. John W. Foster on his diplomatic mission to Japan and China last winter. Official duties and the disabilities placed upon me by a suspicious military guard prevented me from doing very much collecting, although I eagerly seized such few opportunities that came my way to gather in the tempting array of mollusks that generally seemed near at hand.

There can be no more delightful country in the world to collect in than Japan. The natives are always pleasant and courteous and often show a disposition to assist. Even my solemn escort at times so far forgot pride and dignity as to remove their swords and wade in the muddy rice fields to capture the "dobukai." Land and fresh-water shells are abundant almost anywhere. The mountain sides are especially rich in that variable Helicid group of *Eulota* (*Euhadra*) *luhuana*, its many forms and varieties. *Clausilias* cluster together in old stumps, and the rice fields fairly swarm with *Corbicula*, *Vivipara* and *Melania*. One rainy day at Nikko, a coolie brought me a branch of mulberry, upon which seventeen fine specimens of *Euhadra brandti* were crawling.

The only marine collecting I could do was at Shimonoseki, and in the neighborhood of Nagasaki. Both these localities are delight-

fully rich in marine forms, especially the latter point, where a larger number of the true Indo-Pacific species occurs. At Nagasaki crowds of fisherwives and their children go out every day at low tide and gather *Tapes philippinarum* Rv. for the markets. These are found in great abundance on the pebbly beaches of the bay, an inch or so under the surface. At a little fishing village called Mogi, on the Gulf of Simbara, where a small stream meets the sea, I spent two days in a conchological paradise. I shall not soon forget the thrill at my first sight of those splendid Indo-Pacific species alive and moving along, that I had only seen before in collections and figured in books. Here at low tide an exposed stretch of rocky reef was covered with *Monodonta labio* L., *Purpura tumulosa*, *Chlorostoma lischkei* Pils., *Chl. turbinatum* Ad., *Chl. rustica* Gmel., *Turbo coronatus* Gmel., and an occasional *Turbo cornutus japonica* Rve. In the crevices of the larger boulders, hidden from the light, *Euthria ferrea* Reeve clings to the rough surfaces of the granite, and *Littorina sitchana* Phil. must be sacrificed at every step. In the little pools of clear water left by the receding tide, myriads of *Umbonium* glisten in the sunlight like gems, along with the more dingy *Potamides*. Under the stones are hidden all manner of nice things—the usual *Tapes* and a quantity of small species; occasionally a pretty *Calliostoma consors* Lisch., and now and then a fine, large, spiny Murex (*M. axicornis*!)

A sand- and mud-bank at the mouth of the little river is most interesting. Among a wealth of species and a profusion of specimens I stood dazed and excited. *Fusus* (two large species), with their brilliant scarlet-red bodies made furrows in the soft sand, and *Siphonalia kelletii* seemed quite as abundant. The large, fine *Polinices ampla* and *Eburna japonica* Sowb. thrive in the half mud half sand. Scattered along the shore and washed in from the deeper waters of the bay I found good specimens of *Hemifusus*, *Rapana bezoar*, *Ranella bimpas*, *Triton tritonis*, *Fascolaria trapezium*, *Siphonalia cassidariaeformis* and *longirostris*, *Cassis pyrum* Lam., and *Astralium modestum* Rve.

Among a number of bivalves I remember, in particular, *Soletellina boeddinghausi* Lisch., *Tellina praetexta* Marts., *Arcasuberenata* Lisch., *Cytherea lusoria*, *Cucicella chinensis* Desh., *Dosinea japonica*, *Mactra rueriformis*, *Pecten japonicus* and *laqueatus*.

While collecting at this charming spot, I was assisted by a swarm of naked children, who vied with each other in finding specimens,

and whose little, black, oblique eyes could almost see around corners.

The market places usually offer a number of the more common species, among which one can often pick out rarer and more desirable forms. *Eburna japonica* and a large *Curdium* seemed the most favored as articles of diet.

**ANNOTATED LIST OF THE MOLLUSCA FOUND IN THE VICINITY OF
CLEARWATER, WRIGHT CO., MINNESOTA.**

BY H. E. SARGENT, WOODVILLE, ALA.

PART FIRST—LAND SHELLS.

Having the past summer at our disposal, and needing rest, our plans were laid gastronomically to enjoy the fruits of the old home-stead garden, the pride of our octogenarian parent; socially, to renew the acquaintance of relatives and friends of former years, and, scientifically, for our own gratification and perhaps that of our fellow conchologists, to work up as fully as possible the molluscan fauna of the immediate vicinity of our sojourn. The two first desiderata of the vacation were a pre-eminent success, and our friends may be our judges as to the latter.

Clearwater, Wright Co., Minnesota, is situated on the Clearwater River, at its junction with the Mississippi, some 60 miles above the famous Falls of St. Anthony.

The Mississippi, at this point is, at times, deep, rapid and filled with loose logs for the Minneapolis saw-mills. At the time of our investigations it was shallow, quiet and free from logs, thus greatly aiding in our search. Its bed being in the glacial drift, contains but little, if any, lime-rock.

Fine granite is quarried from the outcropping of the Archæan rocks at St. Cloud, only 15 miles above.

The several islands which occur at this point are low and densely overgrown with willows, elms, vives and rank weeds.

Being protected from fires, the undergrowth is a perfect tangle of dead limbs and living weeds. The portions which are overflowed in high water are cleared and more open.

The Clearwater River, a small stream easily crossed dry shod in summer, is from 8-10 miles long, and the outlet of Clearwater Lake. Except in the most rapid portions, it is muddy under its banks, with an occasional muddy slough connected.

Clearwater Lake is a beautiful sheet of water. It is 10 or 12 miles long, from a few rods to 3 or 4 miles wide, and very irregular in outline. Over most of its bed it is pebbly or rocky and quite shallow, many acres in its centre being less than two feet deep. The surrounding timber is quite heavy, and furnishes good retreats for land mollusks, while the maples, elms and oaks, by their abundant shade, keep the soil somewhat moist.

Belle and Heath Lakes, situated two miles west from Clearwater, are small, deep, weedy and muddy, and are typical of several other lakes visited, of which no further mention will be made.

Their floors, at margin, are covered with fine, marly mud deposit, and are heavily overgrown with rushes and white lillies. Beyond the water's edge, the shores are boggy and overgrown with rank grass. The surrounding country is rolling and sandy; timber, scrub-oak, poplar, birch, and other small shrubby trees—and to still further render it unfit for molluscan habitation, it is frequently overrun by forest fires. No shells were found away from the immediate vicinity of the lakes.

Land species were collected at the following stations:

Station B. Belle Lake. Among grass roots on crowns of bogs, unless otherwise designated.

Station C. Clearwater Lake. Sifted from leaf-mould taken from banks of small spring rill.

Station I. Islands in Mississippi River at Clearwater.

Station R. Rockford, Minn., 20 miles south of Clearwater.

Station D. Drift in Mississippi River at Bellevue, Ia.

Station E. Vicinity of Bellevue, Ia.

Valuable assistance has been rendered in verifying and identifying by Dr. Sterki.

1. *Selenites concava* Say. D.

2. *Pseudohyalina milium* Morse. C.

3. *Pseudohyalina minuscula* Binn. R, under chips at water's edge of Crow Creek. B, D.

4. *Zonitoides nitida* MuH. C, under boards among the reeds at lake margin. I, very abundant under fine bark chips at water's edge. E, crawling among weeds near creek.

5. *Vitrea radiatula* Ald. Common at B and C.

6. *Vitrea radiatula* Ald. (albino), very closely resembling *H. binneyana*. A beautiful variety found at both B and C, together with the typical specimens.

7. *Vitrea arborea* Say. C, B, I, R.
8. *Conulus fulvus* Drap. Very plentiful at B and C under decaying logs. I, R.
9. *Strobilops virgo* Pils. C, specimens perfectly colorless. D, R.
10. *Strobilops virgo* Pils. (dark brown variety). At C, in company with, and at B, without typical specimens.
11. *Punctum pygmaeum* Drap. C, B.
12. *Pyramidula striatella* Auth. B, C, I, R.
- 12a. *Pyramidula striatella catskillensis* Pils. Clearwater Lake.
13. *Pyramidula alternata* Say. Under decaying logs at C, I, D.
14. *Helicodiscus lineatus* Say. Very numerous and rather undersized at C, D.
15. *Polygyra (Triodopsis) multilineata* Say. I, E, island in Mississippi River near Bellevue, Ia. At both stations mature shells were very thin and delicate.
16. *Polygyra (Tridopsis) clausa* Say. D.
17. *Polygyra (Stenotrema) hirsuta* Say. D.
18. *Polygyra (Stenotrema) leai* Ward. I, under drift; E, bogs on banks of creek; B.
19. *Vallonia perspectiva* Sterki. I and R.
20. *Ferussacia subcylindrica* L. C, B, I, R.
21. *Pupa pentodon* Say. B, D.
22. *Pupa edentula* Drap. C.
23. *Pupa contracta* Say. B, C, D.
24. *Pupa holzingeri* Sterki. C, D, I.
25. *Pupa curvidens* Gld. C, D.
26. *Pupa corticaria* Say. C, under bark of decaying log.
27. *Pupa armifera* Say. B, on sandy hillside; D.
28. *Pupa provera* Gld. D.
29. *Vertigo ovata* Say. B, C.
30. *Vertigo ventricosa* Morse var. *elatior* Sterki. B.
31. *Vertigo tridentata* Wolf (1 example, 4-dentate) D.
32. *Vertigo milium* Gld. D.
33. *Succinea ovalis* Gld. C, B, R. Crawling on slough grass.
34. *Succinea obliqua* Say. I, very fine specimens among under-brush and weeds; C, E, on island in Mississippi River.
35. *Succinea avara* Say. I, very abundant under pine bark chips at water's edge.
36. *Carychium exiguum* Say. C, B.
37. *Carychium exiguum* Say. var. R, C.

38. *Carychium exile* H. C. Lea. D, C.

The aquatic species will be enumerated in a second paper.

DESCRIPTION OF A NEW AUSTRALIAN CHITON.

BY H. A. PILSBRY.

Chiton Bednalli n. sp.

Oblong, strongly elevated, with acute dorsal keel and straight side-slopes. Cream-white, with a small flesh-pink spot at each beak, and a sparse mottling of same on lateral areas, the central areas clouded with green. Girdle flesh-tinted with green bars.

Median valves acutely beaked, the beaks hardly projecting on the straight or concave posterior margins of valves, which, at the sides, are regularly serrated. Central areas with a narrow, smooth band along the ridge (wider and triangular in valve ii), the pleura with 12 narrow, strong, rounded, longitudinal ribs on each side, separated by flat grooves wider than the ribs; *inner one or two ribs not reaching to anterior margin of valve*. Lateral areas well raised, divided by a median groove (doubled on some valves), which widens at intervals, forming a series of triangular pits; traces of somewhat similar pits appear along the diagonal slope, and the posterior border has a series of transverse undulations corresponding to the denticles of the sutural margin. Valve i with about 20 radial narrow grooves, also pitted; and, like the grooves of lateral areas, these do not extend to the beak, which is surrounded by a smooth area. Valve viii with central projecting muero, the slope behind it very concave; anterior area ribbed, posterior area with pitted radial grooves.

Interior white, blue on the valve callus. Girdle clothed with convex imbricating scales, rounded in contour, and measuring about two-fifths of a millimeter in width, faintly striated toward inner edge of girdle, blunter and smoother toward outer edge.

Length 25, breadth 11 mm.; angle of divergence 98°.

Yorke's Peninsula (W. T. Bednall).

This species resembles *C. Coxii* somewhat, but differs in the peculiar pit sculpture of the lateral areas. Its nearest ally is a still undescribed South Australian species collected by Mr. Bednall. The coloration described will probably be found subject to variation, as usual.

SOME NOTES ON THE GENITAL ORGANS OF UNIONIDÆ, WITH REFERENCE TO SYSTEMATICS.

BY DR. V. STERKI.

It is generally known that in a group of *Uniones* comprising a great part of our species, such as *ligamentinus* Lam., *rectus* Lam., *subovatus* Lea, *parvus* Barnes, *nasutus* Say, *rangianus* Lea, *alatus* Say, etc., the females have the posterior part of their *outer branchiae* peculiarly transformed into "branchial uteri," and also that in consequence of this, in almost all instances the shells of the female specimens are distinctly and decidedly dilated downward at the posterior end, so as to be distinguished from the males at first glance. The degree of difference between the sexes is, however, very different among the several species, but it is constant. For convenient reference in the following, this group is designated as A. There is another group, say B, in which *all four branchiae* are charged in their totality with embryos, as already shown by Lea for some species,¹ but do not show such marked transformation and change in colors as those of the former group, and cause also no such striking differences in the shape of the mussel, according to the sexes. Examples of this group are: *U. subrotundus* Lea, *pustulosus* Lea, *aesopus* Green, *undulatus* Barnes.

There are some facts of peculiar interest in connection with this grouping. The first is that the animals are propagating at certain seasons quite different for the two groups, as the writer has ascertained by examining thousands of specimens during the last four or five years. In group A the branchial uteri are charged with embryos from late summer to the beginning of winter, and probably in most through the winter, while in early summer they are empty, the embryos having been discharged. At that time the ovaries of the females are charged with ova, and the testes of the males with spermatozoa, while the latter are missing, or quite scarce, in the time from late summer to winter, in which time the embryos attain their maturity in the branchiae.

In group B, just the reverse is true. During the fall, *i.e.*, about from August, and probably winter, the branchiae are empty, containing no embryos, while the ovaries are filled with ova, and the

¹ Yet Huxley, in his valuable "Man. Anat. of Inv. An.," says: "In *Unio* and *Anodonta* the young are hatched in the outer gill pouches of the parent"

testes with the white, creamy sperma (rarely of a different color.) During early summer, the branchiae will be found filled first with developing ova and then with embryones, which are discharged about in July; at that season the ovaries and testes are sterile. There are slight variations as to the time, but the general rule is as stated.

This radical difference in the season of producing ova and sperma, and maturing the embryones, coincident with the differences of the location and formation of the uterus sacs is highly interesting, the more so as they are in harmony with the differences in the shells, and thus seem to furnish systematic characters of a high order. In group A the mussels are generally more or less elongated, or at least longitudinal, that means with a small angle of torsion of the axis,² the hinge-teeth are moderately strong, and the epiconch is of a vivid color, as a rule, with numerous rays. In B, the mussels are, as a rule, shorter, the axis-torsion is more considerable, the hinge and hinge-teeth are stronger and of a different shape, and the epiconch is generally of a more uniform, dusky color.

Yet there seem to be some real or apparent exceptions, and dissident members of both groups. In *U. lens* Lea and *ellipsis* Lea the propagating organs are of exactly the same type as in group A, and also bound to the same season. In the former, which has often been mistaken for *U. cinctus* Lea, the male and female mussels are very different, the latter being strongly dilated downward posteriorly—Lea's figure represents a female specimen well; the shell is also not heavy. In *U. ellipsis* the female mussel is also dilated and more full posteriorly, though not so marked, yet, as a rule, recognizable; the lighter color and green rays of the younger approaches it to group A, and more so, in the writer's opinion, the formation of the posterior mantle edge, which is of the same appearance as in the other species ranging under A.

On the other hand, two species, with an elongated mussel, *U. cuneatus* Barn. (*niger* Rat., *crassidens* v. C. Lam.) and *gibbosus* Barn. range with group B, as to their generative organs, and also in the season, while they at least show no downward dilatation of the female shell (in *cuneatus* it seems to be decidedly higher in general) and their shells are comparatively heavy, the epiconch is of a uniform deep brown or black, though having some green rays when young, as do also *U. subrotundus*, *coccineus* etc.; the shell is very

² More about this feature will be said in another place.

heavy in *crassidens*, and the teeth very strong and of the same type with the other species of group B, while the decided downward curvature at the posterior end in old specimens approaches both species to the same, and removes them decidedly from A.

In *U. multiplicatus* the female was found November 1, with evidently mature embryos filling the uterus saes, which are of rather the same appearance as those of *U. alatus*, and occupying the most posterior part of the outer branchiae. Also, otherwise this species is quite different from *U. undulatus* Barn., in spite of the similar appearance of the old mussels, as already pointed out by Say.

A few words about *U. alatus* Say, *laevissimus* Lea and *gracilis* Barn. may be added. Of all three the branchial uteri were found filled late in October, in the former evidently discharging the embryos, and of a rather different formation from that in the two others, while the young mussels of the two former species are very much alike. It is known that in *U. alatus* the female mussel is markedly produced downward, and more so in *gracilis*, while in *laevissimus* it is scarcely distinct from the male.

Besides these two main, and, as it seems, most numerous groups, there are some species of quite different types. In order not to let this article become too lengthy, they, together with *Margaritana* and *Anodonta* will be considered later.

It is probably known to most conchologists that during the first two or three years of life, the genital glands are not developed at all. Yet the specimens are still rather small and young when they begin producing ova and sperma, and the assertion that the presence of embryos is a criterion of maturity of the parent is as far from truth here as it is for the *Cycladidae*. In group A the filled uterus- or embryo-saes increase in numbers as well as in size with advancing age of the mother animal. In *U. suboratus* Lea, e. g., 18, 25, 28, 40 have been counted on a side, in specimens of different sizes, and these are probably not the lowest and highest numbers to be found, and correspondingly so in other species. For every one of them there is, however, an average number the rule for an adult, and these numbers are very different for the different species.

The embryos, or glochidia, of many species have been examined and figured long ago, especially by Lea, and they prove to be of rather different forms. Very probably they would be found more or less uniform in the several groups, and with the latter show differences which may also be of value for systematics. Although

having examined some of them, and their development, the writer is not prepared, as yet, to speak in a general way about them.

New Philadelphia, Ohio, Nov., 1895.

NOTES AND NEWS.

NEW RECORDS OF REVERSED AMERICAN HELICES.—I have myself found three reversed Helices. First, reversed *thyroides*. This specimen I sent to the late John G. Anthony for the Cambridge Collection. Second, reversed *multilineata*. This also I sent to Anthony. I now have another reversed *thyroides* in my collection. I also know of a third one, collected near Cincinnati, by the late Mr. Stannage, and also of a reversed *mitchelliana* collected by Prof. F. W. Bryant near Cincinnati.

This makes a list of six reversed specimens of *Mesodon*, which I have seen. Dr. Lewis had a reversed *albolubris* in his collection. This does not indicate that *Patulu* has much the start.

—A. G. WETHERBY, *Magnetic City, N. C.*

VITRINA LIMPIDA IN WESTERN PENNSYLVANIA.—The last time I saw you I promised to send you some living *Vitrina limpida* Gld. if my "colony" had not died out, so I send you a dozen and trust they will reach you in good shape.

Last year I only found 12 alive, so feared the "colony" had died out, and, up to to-day, had not found a single specimen this year. It has been exceedingly dry this season, the deficit in rain fall being *nearly 11 inches* up to November 1, but yesterday we had a steady, soaking rain; so to-day I started out for *Vitrina* and collected 95 in two hours, so you see, the "colony" is still flourishing in spite of the drought, and burning off the "drift" under which they lived. I think I told you that this "colony" came down the river in the flood of February, 1891, as that was the time the drift lodged in the hollow where they are found, and the Signal Service records show that the '91 flood came from the headwaters of the Allegheny. This is a good example of "dispersal by water," and one that has practically been proved.

To-day was cold and raw, with slight snow-selts (Signal Service record for November 10 show maximum temperature 39° F., minimum 36° F.), so *V. limpida* has the same habits as its European

cousin *pellucida*, i. e., out in cold weather. I noticed one or two eggs among the rotten leaves.

As to the habits of *Vitrina limpida*, they were very hard to find yesterday [Nov. 17], as it was much dryer than a week ago, and most of the shells had crawled into the curled-up leaves. One specimen was busily engaged in making a meal off of the shell of a deceased brother or sister, eating right through the shell as is the habit of the *Zonites*.—GEO. H. CLAPP, Pittsburg, Pa., in letters.

THE STEARNS LOAN COLLECTION IN THE DETROIT MUSEUM OF ART.—The citizens of Detroit, Michigan, are to be congratulated upon the addition to their facilities for scientific and aesthetic education, of the great collection of archaeological and ethnological material of MR. FREDERICK STEARNS. We quote the following from the Detroit *Evening News*, of November 1 :

“ The occasion which last night emphasized the significance of the gathering at the Detroit Museum of Art is one which the whole Detroit public ought to recognize. It was the formal dedication to the public use of the additional gifts lately made to the museum by Frederick Stearns. The archaeological and ethnological collection which Mr. Stearns placed in the museum last night is in itself valuable enough to entitle the donor to public gratitude, but when it is considered that the presentation of last night's collection was but an incident in Mr. Stearns' past relations to the institution, the event places Mr. Stearns among the foremost of Detroit's public benefactors. The very presence in a community of a goodly number of persons of Mr. Stearns' tastes and artistic discrimination is a refining influence, but when such a man is willing to contribute not only his technical acquirements and skill, but his pecuniary substance for the common good, the fact goes a long way to negative the current notions about the crime of being rich and refined in taste. The reception of last evening was a recognition in part of the public's appreciation of its indebtedness to Mr. Stearns' munificence, but the best and real recognition will be given from day to day by the individuals who are edified and profited by their visits to the museum. The *News* tenders its acknowledgements to Mr. Stearns of all the benefits which he has conferred upon Detroit through his generosity to the Museum.”

We understand that Mr. Stearns is preparing a series of Mollusca for exhibition in a special hall of the Museum of Art.

NOTICES OF NEW PUBLICATIONS.

DESCRIPTION D'UNE NOUV. ESPECE DE MODIOLA (Feuille des Jennes Naturalistes, May-June, 1895), *M. gallica*, Dautzenberg, from the ocean coast of France.

ON THE VALIDITY OF THE GENUS MARGARITANA. By Charles T. Simpson (Amer. Nat., April, 1895). The author maintains that *Margaritana* is not a natural genus, but is of polyphyletic origin, the species having arisen from various diverse groups of Unioines.

SCIENTIFIC RESULTS OF EXPLORATIONS BY THE U. S. FISH COMMISSION STEAMER ALBATROSS. *Report on Mollusca and Brachiopoda dredged in deep water chiefly near the Hawaiian Islands, with illustrations of hitherto unfigured species from Northwest America.* By William Healey Dall. Eight hauls of the dredge were made by the *Albatross* in between 300 and 400 fms., on approaching Honolulu, securing a number of very interesting new forms of the genera *Scaphander*, *Pleurotoma*, *Mangilia*, *Spergo* (a new group) *Polinices*, *Solariella*, *Emarginula*, *Dentalium*, *Euciroa*, *Lyonsiella* and *Pectunculus*. The anatomy of *Euciroa*, *Halicardia* and a new *Lyonsiella* is discussed by Dall at some length, and the important point that the foliobranch type of gill exists in certain members of groups in which most genera have the reticulate type, is brought forward and amply fortified by figures. Moreover, the branchial septum is shown to be of diverse origin in some allied genera, being made up in part of a reflected nephridial lamina in *Halicardia* and *Lyonsiella*. The facts developed tend strongly to break down the primary division of Lamellibranchiata based upon the modifications of the gill, as in the classification of Pelseneer. *Euciroa* is shown to be different from *Verticordia*, of which it had formerly been considered a subgenus, and a new family, *Euciroidæ*, is formed for it. In gill structure it seems to be intermediate between the foliobranchiate and the reticulate types. "The discovery of this type may be said to practically complete the series uniting the foliobranch with the reticulate gill, and give the quietus to the classification based solely on the divergencies of the ctenidia."

The examination of the soft parts of *Mytilimeria flexuosa* shows that form to constitute a new genus now described as *Halicardia*.

The second part of the paper gives additional information on Northwest American species of *Buccinum*, *Chrysodonus*, *Trophon*, etc., described in Proc. U. S. Nat. Mus., 1891, with good figures of many interesting forms. A valuable essay on the north Pacific Brachiopods concludes the article.

THE NAUTILUS.

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TO CONCHOLOGISTS.

We regret the necessity which compels us to start the new year with an editorial of this nature; but it is nothing new to hear that the NAUTILUS must struggle for existence. This struggle has continued since the Jura, until now we have but a few species, three or four in the Indo-Pacific and one in the United States. Do you intend that the only recent NAUTILUS in North America shall become extinct? We are willing to supply the care, but not the entire environment. It needs feeding once a month in order to add another septum. You are asked to assist in this important function once a year; and when you see a slip of paper which reads, "Inclosed please find \$1.00," it means that it has come your turn to "chip in." We hope that you will no longer neglect these little reminders. They mean that *your* subscription is due. We cannot wait until the end of the year—*we must have it in advance*.

Wishing you all a Happy New Year.

H. A. P. & C. W. J.

NOTES ON THE WASHINGTON SPHÆRIA AND PISIDIA, WITH DESCRIPTIONS OF NEW SPECIES.

BY EDWARD W. ROPER.

The great State of Washington has been lightly touched by collectors of freshwater shells, but enough is known to indicate that when its hundreds of lakes and rivers are scientifically explored, large and interesting collections will be made. The researches of

Mr. P. B. Randolph at Seattle, and Mr. Henry Hemphill in several localities, have brought to light a goodly array of *Sphaeria* and *Pisidia*, and regarding these the following notes may be of interest.

Sphaerium primeanum Clessin. This shell, described in the Monograph of the Cyclades, is so little known to collectors that a brief description will be useful. Shell large, equilateral, dark brown or black with lighter beaks, shining. Outline rhomboidal, a little more elongated and the ends more rounded than *Sph. rhomboideum* Say, but the dorsal aspect very much like that of the species. The full, rounded beaks make the vertical section broadly cordate. One specimen, chestnut colored and with yellow border, is so close to *Sph. rhomboideum* as to be held in doubt. That species has been found in northern Idaho, and may naturally be expected from Washington. *S. primeanum* was found in Lake Washington, Seattle.

S. dentatum Hald. Handsome, bright green shells, differing only in color from brownish Oregon specimens, are doubtfully referred to this species. Collected at Spokane Falls by Mrs. Mary P. Olney.

Sph. nobile Gould. Identified by Dr. J. G. Cooper. It is a large, shining, dark brown shell, resembling *Sph. dentatum* Hald., but less inflated. The young shells are thin and smooth, while in *S. dentatum* they are more heavily striated than the adult. Abundant in small streams, Seattle.

Sph. occidentale Prime. Found at Spokane Falls by Hemphill.

Sph. raymondi J. G. Cooper. Small specimens abundant in streams at Seattle. Larger ones in Lake Washington. Beautiful specimens from Spokane Falls and Chehalis River (Hemphill). Also found in Idaho and Vancouver's Island. The species was found originally by Mr. Wm. J. Raymond in Tuolumne Co., Cal., at an altitude of 8700 feet, in 1889.

Pisidium idahoense Roper. First found by Mr. Henry Hemphill at Old Mission, Idaho, in 1890. Found abundantly in streams at Seattle by Mr. Randolph, and much larger than the types. One fine specimen has the following dimensions: Long. 0.45 inch; lat. 0.39 inch; diam. 0.30 inch. This is certainly the largest known species of *Pisidium*.

P. variabile Prime. Streams at Seattle. Unusually large.

P. compressum Prime. Green Lake, Seattle.

P. abditum Hald. Common in water courses at Seattle.

P. ultramontanum Prime. Unusually robust specimens from Seattle. As nearly every *Pisidium* found on the Pacific Slope has been

sent out under this name, it may be well to say that this shell is somewhat triangular with rounded margins, nearly as large and solid as the average *P. variabile*, horn colored shading to yellow at the borders, some specimens with dark blotches or stripes near the basal margin. The California types were described as having "valves shallow in the cavity," but the northern shells are more full and rounded.

P. randolphii n. sp. Shell rounded oval, moderately inflated; anterior end elongated and perfectly rounded, no angle indicating the junction of the anterior and basal margins; posterior margin sloping abruptly from the very short hinge margin; beaks decidedly posterior, fairly prominent; surface very finely and evenly striated, polished, of a most peculiar greenish-yellow color, different from other *Pisidia*, but much like some *Corbiculas*. This of itself makes it easy to separate from *P. abditum* and *P. variabile*, associated species. Long. 0·18 inch; lat. 0·14 inch; diam. 0·10 inch. Found at Seattle. Dr. J. G. Cooper says the shell most nearly resembling this is *P. harfordianum* Pr., a species practically unknown to collectors, and of which he has only a young specimen.

P. —————? n. sp. A rotund, orbiculate, dull yellow *Pisidium*, with prominent beaks and projecting scutellum, was collected by Mr. Hemphill in Patten Lake, Whatcom County. Dr. Sterki considers it identical with a species apparently common in the region of the Great Lakes, to which he has applied the name *P. sentellatum* (in letters). A deep water form is supposed to be *P. abyssorum* Stimp., but as Dr. Stimpson's manuscript was destroyed by fire, and his types mixed, this can never be certainly known. Figures and more minute descriptions of this and *P. randolphii* may be expected in Dr. Sterki's coming monograph. Additional specimens are urgently desired of this and other species of the Pacific Slope, which are, at present, deplorably scarce.

I believe it is safe to say that *P. insigne* Gabb., *P. harfordianum* Prime and *P. angelicum* Rowell are unknown, except from the original lots. *P. occidentale* Newcomb seems to be only a form of *P. abditum* Hald. Additional specimens may confirm that view or prove the contrary. The most experienced collectors disagree regarding the identity of the *Sphaeria*. This tangle need not long remain if sufficient material can pass under the eye of a competent conchologist. Pacific coast collectors have generally given their attention to marine and land shells, and it would seem that a field for discovery is open among the freshwater species.

NOTES ON COLLECTING SHELLS IN CHINA.

BY JOHN B. HENDERSON.

When I saw Mr. Schmacker's splendid collection of Chinese mollusks in Shanghai, and looked over Père Heude's *Unios* at Sia-way, I was laying the foundation for a bitter disappointment when I took to the field myself. The great alluvial plains extending from Peking and the Gulf of Pechelli on the north to Shanghai and the lower Yangtsze on the south, are not particularly rich in species. My good friend, Mr. Schmacker assured me that "the hills" fairly trembled with molluscan life; but the hills were far away, the season unfavorable, so I continued my search along the muddy banks of the rivers and the slimy waters of the canals near Shanghai, with from fair to poor success, it being then too cold (January) for land shells.

The bulk of Chinese *Unios* that so closely resemble our Mississippi forms, live almost entirely in the upper waters of the great rivers and their tributaries that flow through the high lands of the interior provinces. In the neighborhood of Shanghai, *Unio murchisonianus* and *Unodonta woodiana* were the only naiads I met with, but these were generally abundant. *Corbiculas* and the two *Viviparas*, *chinensis* Bens. and *quadrata* Bens. are plentiful in the canals. I secured the services of one, Ah Sin, a bland and suave celestial, to collect for me. Ah Sin brought me, day by day, numbers of *Cyclina sinensis* wrapped in endless papers, that he assured me were rare and highly desirable *Unios* from the inaccessible Thibetan frontier. So Ah Sin proved a failure.

Upon a three days' journey in a house-boat from Tientsin to Tungchow (on the Pei-Ho River), I did not observe a single shell of any kind. From Tungchow to Peking, about 15 miles, I gathered quantities of *Viripara*, *Unio* and *Corbicula* in the canal, and in the dried pools by the roadside many *Limnara*. The walls of Peking swarm with *Cathaea pyrrhozona*; I even gathered a number of them in my bed-room, where they clung to the ceiling. This species has a wide distribution throughout China, as well as *Bithinia striatula* Bens. which I gathered in the canals about Tientsin.

Unfortunately, I had no opportunity to try the good marine collecting of the southern China coast, my only attempts for marines being in the immediate vicinity of Shanghai and at Che Foo and Taku on the Gulf of Pechelli in the north. The fauna of this region is not particularly interesting, consisting only of a limited

number of boreal forms, some of which can be traced along the Aleutians to Alaska and down as far as Vancouver.

These northern waters of the Yellow Sea on the Chinese side and the Gulf of Pechelli are not conducive to molluscan life on account of the immense quantities of mud poured in by the Yangtsze and the Hwang Ho Rivers. The amount of this deposit is almost incredible. The shore line from the mouth of the Yangtsze, several hundred miles north, is a great mud bank that is rapidly extending out and filling up the shallow sea. The few Pelecypods that rejoice in such surroundings must keep awake to avoid being "snowed under." They are exceedingly difficult to obtain, and especially when the icy winter winds blow as they do in that inhospitable region. From such stations I secured an *Aret*, a *Solecurtus*, *Cyclina sinensis* and a *Solen*.

At Che Foo, where the shore is more bold and rocky, a few *Monodonta lubio* and *Littorina sitchana* rewarded a diligent search at low tide.

I made a desperate attempt to take advantage of the excellent collecting in the island of Formosa, but the circumstances of my visit to that most beautiful spot was such that I found it dangerous to venture out. Some natives, however, brought me quantities of beach worn shells, out of the lot of which I selected a few fairly good specimens of *Chlorostomus argyrostomum*, *Patella testudinaria*, two *Haliotis*, and *Cyprea isabella*.

The collector in China must be of a patient and amiable disposition to endure the throng of gaping fools that follow and ply him with a thousand questions. The quick tempered man is sure to get into trouble and get no shells.

SHELLS OF SEATTLE, KING CO., WASHINGTON.

BY P. B. RANDOLPH.

The following species I have collected within the city limits during the past year:

Selenites vancouverensis Lea.

Selenites sportella Gld.

Selenites sportella hybrida Anc.

Zonites lucidus Drap. (introduced).

Zonites arboreus Say.

Zonites pugetensis Dall.

Zonites johnsonii Dall.

Conulus fulvus Drap.

Pristiloma lansingi Bld.

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|---|--|
| <i>Pristiloma stearnsi</i> Bld. | <i>Margaritana margaritifera</i> Linné |
| <i>Punetum conspectum</i> Bld. | <i>Sphaerium nobile</i> Gld. |
| <i>Punetum randolphi</i> Dall. | <i>Sphaerium raymondi</i> J. G. C. |
| <i>Epiphragmophora fidelis</i> Gray. | <i>Sphaerium primeanum</i> Cless. |
| <i>Epiphragmophora fidelis minor.</i> | <i>Pisidium compressum</i> Prime. |
| <i>Epiphragmophora fidelis albino.</i> | <i>Pisidium idahoense</i> Roper. |
| <i>Polygyra</i> (<i>Mesodon</i>) <i>townsendiana</i> Lea. | <i>Pisidium ultramontanum</i> Prime. |
| <i>Polygyra</i> (<i>Mesodon</i>) <i>columbiana</i> Lea. | <i>Pisidium variable</i> Prime. |
| <i>Polygyra</i> (<i>Mesodon</i>) <i>devia</i> Gld. | <i>Pisidium additum</i> Hald. |
| <i>Polygyra</i> (<i>Stenotrema</i>) <i>germana</i> Gld. | <i>Pisidium randolphii</i> Roper. |
| <i>Vertigo simplex</i> Gld. | <i>Physa gabbi</i> Tryon. |
| <i>Vertigo binneyana</i> Sterki. | <i>Limnaea tryoni</i> Lea. |
| <i>Succinea oregonensis</i> Lea. | <i>Limnaea palustris</i> Linn. |
| <i>Succinea nuttalliana</i> Lea. | <i>Limnaea humilis</i> (introduced) Say. |
| <i>Carychium occidentalis</i> Pilsbry. | <i>Planorbis trivolvis binneyi</i> Try. |
| <i>Anodonta californiensis</i> Lea. | <i>Planorbis callioglyptus</i> Vanatta. |
| <i>Anodonta oregonensis</i> Lea. | <i>Planorbis vermicularis</i> Gld. |
| | <i>Ancylus fragilis</i> Tryon. |
| | <i>Valvata sincera</i> Say. |

ISAAC LEA DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

Next month we will be able to announce the result of the annual election of officers for the Chapter.

This has been a year of activity along conchological lines in our chapter, and plenty of good reports are sure to follow enthusiastic work.

The fraternal spirit expressed by the members of our Chapter reveals the goodwill of each member, and is a pleasant feature in work of the Association.

COLLECTING IN SOUTHERN CALIFORNIA.

[Report of Mrs. G. W. White. From the Transactions of Isaac Lea Conchological Chapter of the Agassiz Association for 1894.]

My interest in the science of conchology dates from the summer of 1893, when Prof. Josiah Keep, of Mills College, taught this sub-

ject during the Chautauqua Assembly at Long Beach, Cal. Though unfortunately, not a member of his class, some of my friends were enthusiastic students under him, and through them, the enthusiasm or "craze," as we sometimes call it, was communicated to me, and I very shortly became as eager a student and collector as my circumstances would allow. Happily for me, my husband shared my interest, and most of our collecting has been done together, and many of my choicest treasures were found by him in places I could not venture—in places where the waves dashed too high for my courage, or under rocks too heavy for my strength to lift. So this report must be understood as a record of our joint work.

In the winter of '93 and '94, we made a number of visits to Long Beach and San Pedro, going as far as Alamitos Bay in one direction and nearly to the old wharf beyond Times' Point at San Pedro. We collected quantities of shells, but as it would be impossible and unprofitable to mention them all, I will speak only of the rarer ones.

Under the rocks at Dead Man's Island, we found, on our first trip, a number of specimens of each of the following varieties: *Volvaria varia*, *Terebratella transversa*, and *Lazaria subquadrata*.

We also dug a number of fine fossil peetens out of the bank. One of the choicest shells found by us that day has never been fully identified by me. By some it is called *Cerostoma foliatum*, by others *Murex trialatus*.¹ At any rate it is a rare and interesting shell, and I have never seen another like it. On another trip up the beach above San Pedro we found, by digging in the sand with a trowel, some fine specimens of *Stenoradsia magdaleuensis*, the largest Chiton on this part of the coast.

We also found several *Himites giganteus* Gray, *Cumiumia californica* Conr., *Lucania crenulata* Sby., and a fine old *Mitra maura* Swains., two inches in length, of which we are justly proud. In the spring of '94 we were on a visit in Ventura County, and when our friends proposed a trip to the beach, we interposed no objections. They drove to Punta Gorda, meaning Point of Rocks, most appropriately named, for I have seldom seen such a bed of rocks jutting out so boldly into the sea. They were literally covered with the largest species of mussels, many of them being nearly, if not, six inches in length. In the sheltered places in these rocks we found quantities of *Purpura saxicola* Val. and *Monoceros lupilloides* Cour. Our patient search in the rock pools was rewarded by our finding *Opalia crenuloides* Cpr.

¹ The shell proved to be *Pterorhytis trialatus* Sby.

In the summer of '94, while attending the class in conchology at Long Beach, our teacher, Mrs. M. Burton Williamson, kindly planned an excursion to Dead Man's Island, and took eighteen members of her class to San Pedro the evening before we were to do our collecting. We spent the night at an old seaman's hotel on Timm's Point, and at 3 o'clock A. M., rose to take advantage of the first beams of the sun and the tide, which was to be at the lowest point at about 4.30 A. M. There happened to be a dense fog, and as our ghostly boatman took one boat load after another of our companions away from us across the bay, we were strongly reminded of that other boatman, the Charon of our early studies and the River Styx.

However, by the time we were safely landed on our hunting grounds, the mist had risen and we could see to begin work. The most that we found of value was on the mud flats uncovered by the low tide. There we found, under the grass which lay flat on the mud, thus concealing thousand of mollusks which lay below, *Haminea virescens* Sby., and *Haminea vesicula* Gld. We also found, partly covered with mud, *Cardium quadrigenarium* Conr., and altogether covered with mud except some tiny points of a *Chorus belcheri* Hds. What a shout went around when some one called out, "Mrs. White has found a *Chorus*," and how eagerly the mud in that vicinity was scanned to see if another could not be discovered. But no, I bore off my trophy in triumph alone, for not another one was found.

On our way home, while walking along the beach, some one, I think Mrs. Williamson, called our attention to some narrow slits in the sand, where, upon digging carefully, we found a dozen *Lingula albida* Hds.

Later, on a walk to Alamitos Bay, I found *Periploma argenteria* Conr., *Petricola carditoides* Conr., *Labiota undulata* Gld., *Yoldia cooperi* and *Olidophora punctata* (?) Cpr. * * * * And now this account brings us up to the year of our Lord, 1895, and finds us still enthusiasts in conchology, only waiting for a favorable tide to go again in search of treasures of the sea. We are of those who believe that nature has secrets which she reveals only to those who love her, and we feel that in this kind of communion with her she has fully rewarded us.

NOTICES OF NEW PUBLICATIONS.

CONTRIBUTIONS TO THE TERTIARY FAUNA OF FLORIDA. TRANSACTIONS OF THE WAGNER FREE INSTITUTE OF SCIENCE.—Vol. III, part 3. By Wm. H. Dall, A. M. This forms an introductory chapter to Prof. Dall's work on the Tertiary Pelecypoda of Florida, and contains a new classification of the Pelecypoda, with an enumeration of the differential characters of the Orders, Suborders, Superfamilies and Families, a statement of their range in geological time, and an enumeration under each family of the chief generic groups believed to be referable to it. The paper is prefaced by a brief discussion of the features of the Pelecypod organization chiefly available as diagnostic characters. Continued study of this group has confirmed the author in the opinion that in its general features the classification which he proposed in 1889 (founded largely on the characters of the hinge, see Amer. Jour. Sci., XXXVIII, 445), and has now revised, comes nearer to meeting the requirements of the case than any other which has fallen under his notice. In describing the ligamental characters the term "resilium" is proposed for the so-called "cartilage" or "internal ligament." The Steinmann Formula, based on the teeth, sockets and resilium, is thoroughly explained. The Pelecypoda are divided into three orders—*Prionodesmacea*, *Auomalodesmacea* and *Teleodesmacea*. The first order contains thirty-four families, leading factors being *Solemyidae*, *Nuculidae*, *Arcidae*, *Pteriidae*, *Ostreidae*, *Unionidae*, *Trigonidae*, *Pectenidae*, *Anomiidae* and *Mytilidae*. Each of the above and of the following families being the typical representatives of a Superfamily. The second Order contains fifteen families, typical ones being *Anatinidae*, *Clavagellidae*, *Poromyidae*. The third contains forty-seven families, such as *Pleurophoridae*?, *Astartidae*, *Cyrenidae*, *Carditidae*, *Chamidae*, *Hippuritidae*, *Lucinidae*, *Leptonidae*, *Cardiidae*, *Tridacnidae*, *Isocarditidae*, *Veneridae*, *Tellinidae*, *Solenidae*, *Mactridae*, *Mytilidae* and *Pholadidae*. The paper is concluded with some timely notes on nomenclature.—C. W. J.

CATALOGUE OF THE MARINE MOLLUSKS OF JAPAN, COLLECTED BY FREDERICK STEARNS. By H. A. Pilsbry. Detroit: F. Stearns, 1895. 8 vo, 214pp. and 11 plates.

Every one interested in geographical distribution, or in the fauna of eastern Asia, will be grateful for the liberality of Mr. Stearns, who obtained, and the care of Mr. Pilsbry, who has enumerated and identified, the large collection here treated of.

Not content with the labor of naming and cataloging Mr. Stearns' shells, Mr. Pilsbry has searched the literature and made a catalogue, not only of the shells collected by Mr. Stearns, but of all the species described from or assigned to Japan by earlier authors, thereby producing a most handy list which no student of mollusks can afford to be without. Notwithstanding the care with which the Monographs of Dunker and Lischke were made, the present catalogue enumerates about 20 per cent. more species than the latest of them. In addition to the list of marine mollusks and brachiopods, the land and fresh-water shells collected by Mr. Stearns are catalogued, and also a supplementary series of Loo Choo Island species, obtained by a native collector in Mr. Stearns employ. The plates and presswork are excellent, and the work, as a whole, is creditable to all concerned in its production, and cannot fail to be useful to students.

—W. H. D.

PRELIMINARY CATALOGUE OF THE MARINE MOLLUSKS OF THE PACIFIC COAST OF CANADA, with notes on their distribution. By Rev. Geo. W. Taylor, Transactions of the Royal Society of Canada, Vol. 1 (2d series), pages 17 to 100. This catalogue is very complete and full of interesting notes on distribution, etc. The number of species recorded is 284, to which is added a list of 67 land and fresh-water species, making the total number of British Columbian Mollusca at present known, 351.

BULLETINS OF AMERICAN PALEONTOLOGY, Vol. I, No. 3. NEOGENE MOLLUSCA OF TEXAS, OR FOSSILS FROM THE DEEP WELL AT GALVESTON. By G. D. Harris. In this Bulletin, 19 new species and 5 new varieties are described and figured, together with notes and figures of other species. Most of the specimens were obtained from a depth ranging from 2100 to 2920 feet. Up to this date no other marine Neocene fossils are known from the Gulf slope west of the Mississippi. The Bulletin contains 32 pages and 4 well executed plates.

MOLLUSQUES RECUEILLIS SUR LES COTES DE LA TUNISIE ET DE L'ALGERIE, par Ph. Dautzenberg (Mém. Soc. Zool. de France, 1895, p. 363). List, with descriptions of some new varieties of Mediterranean shells, and full information on the occurrence of *Meleagrina* in the Mediterranean Sea.

ON SOME PLIOCENE FRESH-WATER FOSSILS OF CALIFORNIA.

ON LAND AND FRESH-WATER SHELLS OF LOWER CALIFORNIA.
No. 5.

ON WEST MEXICAN LAND AND FRESH-WATER MOLLUSCA.

CATALOGUE OF MARINE SHELLS * * * LOWER CALIFORNIA. By J. G. Cooper (Proc. Cal. Acad. Sci., IV, V).

In the first of these papers, *Margaritana subungulata* is described and figured as new, and the following species are figured: *Anodonta decurtata* Conr., *Ano. nuttalliana* var. *lignitica* Coop., *Limnaea constricta* Coop., *Planorbis pablosus* Coop. and *Amnicola yatesiana* Coop.

In the second, land shells collected about 25 miles north of Cape St. Lucas are considered. *Bulinulus decipiens* being described as new. The generic name *Plicolumna* is proposed for *Rhodæa* var. *ramentosa* Coop.; it is therefore equivalent to Dall's *Pseudorhordea* (Nautilus, Sept., 1895). The *Melanella eiseniana* J. G. Coop. is referred to Strehel's genus *Pseudosubulinus*, a group of *Glandulae*, on evidence of the dentition, which has been worked out by Dall.

In his paper on West Mexican Land Shells, Cooper announces the presence of the northern forms *Conulus fulvus*, *Hyalinum indented*, *Limnaea columella*, *Sphaerium partumatum* var. *truncatum*, from Tepec, south of Mazatlan, as well as other species belonging to the Mexican fauna.

The last paper enumerates marine shells collected mainly by Mr. W. E. Bryant, including some interesting forms, but no new species.

NOTES AND NEWS.

PLOVER CAUGHT BY A PINNA—The article in the September number, "A Sora Caught by a Mussel," recalls a similar incident which I observed at New Pass, Sarasota Key, Fla. It was after a heavy storm, and there was a large number of *Piuna muricata* washed ashore. On my return to the boat after collecting some shells, I observed a Killdeer Plover that seemed very tame, but on a closer examination I found that it was caught by a *Pinna*. In this case it was caught by the bill. Its tongue was bleeding and the bill was indented by the sharp edges of the shell. It was with some difficulty that I removed the shell and let the Plover go rejoicing on its way.—*E. J. Post.*

MR. CHAS. LEROY WHEELER has been appointed Curator of the Lackawanna Institute of History and Science, Scranton, Pa. They desire to obtain more material in all branches of natural history,

and any assistance from older institutions or their members will be sincerely appreciated.

LEPIDOIPLEURUS IN NEW ZEALAND.—Some months ago we received numerous specimens of a *Lepidopleurus* from Mr. H Suter, collected by him in Auckland Harbor. The species seemed to us to be a new one; but on requesting Mr. E. R. Sykes of London to compare with the types of certain forms in the British Museum, he found it to be identical with Reeve's *Chiton inquinatus*—a result wholly unexpected. The species was described from Tasmania, but South Australian specimens we have seen (collected by Mr. Bednall) agree in all respects with those found by Mr. Suter in New Zealand.—H. A. P.

THE EARLIEST PUBLICATION OF *Dorcasia* GRAY.—In examining the appendix of James Edward Alexander's Expedition of Discovery into the Interior of Africa (London, 1838), I find on p. 268 of volume II, a description by Gray of the genus *Dorcasiu* and the species *D. alexandri*. This group has hitherto been dated from its publication in the *Zeitschrift für Malakozoolgie*, 1845. *Helicodonta sculpturata* Gray (= *Sculpturia sculpturata*) is also described, with (on p. 269) two alleged Bulimi, *B. hottentota* and *B. eulimoide*. All were collected by the expedition about the Great Fish River in Great Namaqualand. *B. eulimoide* apparently belongs to the *Stenogyra* group. This publication seems to have been unknown to Pfeiffer and other writers on African land snails.—Pilsbry.

ON THE NAMES OF CERTAIN SUBGENERA OF *Helicostyla*.—For some inscrutable reason, the writer, when considering these groups in the Manual of Conchology, neglected to ascertain the fact that the names *Prochilus* and *Eudoxus* of Albers have long been preoccupied. They may stand in future as follows:

Dolichostyla n. n. (= *Prochilus* Alb., 1860, not of Illiger, 1814, Mammalia, nor of Brullé, 1835, Orthoptera, nor of Cuvier, 1817, Pisces).

Opallistyla n. n. (= *Eudoxus* Alb., 1850, not of Kirby, 1837, Coleoptera). The types and limits of the groups remain as stated in Man. Conch. (2), ix, pp. 229, 231.—Pilsbry.

SINISTRAL *PATULA STRIGOSA*.—My brother, L. M. Cockerell, took a sinistral *P. strigosa* at Norwood, Colorado. It was in my possession for a long while, but is now in the British Museum.

—T. D. A. Cockerell.

THE NAUTILUS.

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No. 10

THE AULACOPODA: A PRIMARY DIVISION OF THE MONOTREMATE LAND PULMONATA.

BY HENRY A. PILSBRY.

If the foot of a living or properly preserved *Helix* or *Polygyra* be compared with that of a *Zonites*, *Pyramidula* (Patula) or *Ariolimax*, a conspicuous point of difference becomes apparent. In the latter three genera a groove or furrow may be seen running the whole length of the foot, a short distance above and parallel to its edges; while no such structure is present in the first named genera.

These furrows are the *pedal grooves*. They rise slightly at the tail, and meet above it: and at this point there is often a local deepening of the groove, and a greater development of the mucus-secreting cells lining it. This is the "caudal mucus pore," conspicuous in *Zonites*, *Ariolimax*, etc. There is vast variation in the degree of development of this pore,—from a barely visible widening of the united pedal grooves, to a deep slit or a triangular pit surmounted by a fleshy horn; and in some forms it is extremely difficult to say whether a pore exists or not, so nicely graduated are the stages of its development. Consequently, we find genera very closely allied in other characters, differing in this one. Such are *Paeilonzonites*, without pore, *Gastroponta* with it; *Ariolimax* with pore, *Prophysaon* without it; and many similar cases.¹ In spite of all the instances of this kind, the tail pore has been a great bugaboo to the systematists, while the *pedal grooves*, of which this pore is merely an

¹ Compare also, in this connection, Cockerell's remarks in *Journal of Malacology* (*The Conchologist*), Vol. ii, p. 118.

occasional extra development, have been very generally ignored.² Even "families" have been based on the presence or absence of the caudal pore; but it need hardly be said that such groups are violently unnatural.

It is now proposed to unite all of the groups having the pedal grooves developed, into a superfamily to be called AULACOPODA, equivalent in value to the AGNATHIA (so-called, including *Selenitidae*), or to the group composed of *Helicidae*, *Bulimulidae*, *Cylindreltidæ*, *Pupidae* and *Achatinidae*, which may be called HOLOPODA.

The American *Aulacopoda* may be tabulated as follows:

- I. Marginal teeth with narrow, lengthened basal-plates, either unicuspid and thorn-like, or bicuspid by elevation of outer on middle cusp.
 - a. Foot-margin wide; shell more or less spiral; ovotestis imbedded in liver, ZONITIDÆ.
 - aa. Foot-margin narrow; shell a flat internal plate, not spiral; ovotestis free from liver; slugs, LIMACIDÆ.
- II. Marginal teeth with short, wide and squarish basal-plates with one or several cusps, the outer cusp never elevated on middle cusp.
 - a. Shell spiral, usually wholly external, ENDODONTIDÆ.
 - aa. Shell non-spiral, internal, more or less obsolete or wanting; slugs.
 - b. A vestigial shell present; mantle small, anterior, ARIONIDÆ.
 - bb. No shell; mantle covering the whole upper surface, PHILOMYCIDÆ.

Most of these families contain genera with, and genera without a caudal mucus pore. The *Limacidae* and *Arionidae* are degenerate so far as the shell is concerned, and have doubtless descended from the ancestral *Zonitidae* and *Endodontidae* respectively.

North American Genera.

ZONITIDÆ comprises *Omphalina*, *Vitrinizonites*, *Vitrea*, *Gastrodonta*, *Paezilozonites*, *Guppya*, *Conulus*, *Pristiloma* and *Vitrina*. See NAUTILUS, June, 1895, p. 18.

² Exceptions need not be noted here; but I cannot refrain from mentioning that the importance of the pedal grooves has been fully recognized by a brilliant Australian malacologist in dealing with the *Charopat* group.

LIMACIDÆ, *Limax* only.

ENDODONTIDÆ, *Pyramidula* (*alternata*, *perspectiva*, etc.), *Punctum*.

ARIONIDÆ, *Arion* (imported), *Ariolimax*, *Prophysaon*, *Hemphillia* and their immediate allies.

PHILOMYCIDÆ, *Philomyces* (*Tebennophorus*), *Pallifera*.

The systematic position of the *Selenitidæ*, with a revised catalogue of the species and varieties, will be considered in a future article.

ON SOME NEW SPECIES OF SCALA.

BY W. H. DALL.

Scala (Sthenorhytis) Mazyckii Dall.

Shell solid, stout, rapidly enlarging, with (on the last whorl six) stout rather carinate varices which increase in size successively, the last being very heavy, its anterior face sloping backward from the nearly circular aperture; outer margin of the varix even, rounded, slightly winged on the axial side; whorls smooth except for a single faint revolving rib encircling the base at about the level of the top of the aperture of the succeeding whorl; specimen decollate, probably with four or five whorls when complete, the spire probably short and acute. Height 31.5, diameter 28 mm. in the decollate shell.

Miocene, Cainhoy, South Carolina, W. G. Mazyck.

This fine species differs from *S. pernobilis*, *S. Stearnsii* and others of the group by its small number of distant rapidly enlarging varices. The type is in the collection of Mr. W. G. Mazyck, of Charleston, who collected it, and to whom it is respectfully dedicated.

Scala ranellina Dall.

Shell of five or more whorls, rather rapidly increasing, spirally ribbed with ten or twelve rather feeble flattish ridges which are obsolete or absent above the shoulder; basal area projecting, strongly marked, overrun by the varices which are angulated and prominent over the keel; varices of two sorts, one set large, thin, wide set at the half whorl, continuous up the spire on each side like the varices of *Ranella pulchra*, their profiles rounded, the aperture circular,

the axial edge narrower, not perceptibly angular; the other varices are much smaller and less prominent, about seven to twelve on each half whorl between the larger series, sharp edged and subequal. Height of (decollate) shell 33, max. diameter 23 mm.

Zeuglodon bed of the Jacksonian, near Cocoa P. O., Alabama, Burns and Schuchert.

This fine species is related to *S. octolineata* Conrad, which is found in the same horizon, but has the large varices less conspicuous and irregularly distributed. *S. octolineata* is also a smaller, more cylindrical shell. The present species is readily recognized by its peculiar flattened aspect recalling *Ranella*.

Scala Mitchellii Dall.

Shell rather large for the genus, thin, with rounded rather compact whorls, well marked suture and elongated spire; the color is yellowish white, the basal area and a band somewhat above the periphery dark reddish brown; surface with numerous low spiral ridges with wider interspaces covering the whorl, crossed by about 18 distant rather irregular low varical threads, slightly angulated just in front of the suture; the young whorls show a tendency to peripheral angulation; basal area well marked, bordered by a low keel, its spiral sculpture feeble but the varical ridges unchanged; axis imperforate; aperture higher than wide, the peristome interrupted over the body, the pillar lip strongly reflected, the outer lip narrow, inconspicuously reflexed; shell decollate but showing eight whorls, and originally supplied with three or four more at least; height of (decollate) shell 36, max. diameter 14, apical diameter at the decollation 1.5 mm.

Found on the beach of Matagorda Island on the Texas coast by Hon. J. G. Mitchell, to whom it is respectfully dedicated; the type is in his collection. This is the finest recent species from shallow water yet reported from the Gulf coast, and needs no comparison with any other, as no American or exotic species has been figured which is at all closely related to it. In a general way it is somewhat like *S. acuminata* Sby. from Japan.

SCULPTURE OF THE APICAL WHORLS, A NEW CHARACTER FOR DISTINGUISHING GROUPS OF BULIMULI.

BY HENRY A. PILSBRY.

The classification of the American Bulimoid snails has been an extremely intricate problem, but much has been done by Binney,

Strebel and Pfeffer, von Martens and Crosse and Fischer, toward a better understanding of it.

With all of this good work, there has remained a vast amount of confusion. Thus authors almost universally separate *Orthalicus* as a family distinct from *Bulimulidae*; but, in reality, it constitutes merely a generic group of that family. No anatomical or shell character can be shown, of greater than generic value, between *Orthalicus* and *Drymaeus*.

Again, the genus "*Bulimus*" of all authors contains forms belonging to two families—*Helicidae* and *Bulimulidae*.

The forms generally grouped under the name *Bulimulus* have been shown by von Martens to fall into two groups, based on the character of the jaw: *Bulimulus* and *Otostomus*. Crosse and Fischer have made the same division, calling the two groups *Orthotomium* and *Goniognathmus*. These correspond to the two Martensian groups, the first having a vertically plaited jaw, the second has the plates angularly converging toward the middle.

Binney has shown that there exist two styles of teeth, and these correspond to the two forms of jaw, and constitute a far more useful character, as the jaw forms intergrade pretty completely.

It has not hitherto been noticed that there are certain characters in the shells, and especially in the sculpture of the apices, by which the two groups, or genera, may be distinguished.¹

In the following synopsis, the leading sections are enumerated, arranged as they fall into groups according to the sculpture of the apices. Of course it is not proposed to base a classification on this single character.

Certain rectifications and substitutions demanded by the law of priority, and by the proper restriction of the subgenera to species allied to their *types*, have been made.

Genus *Bulimulus* Leach, 1814.

The species of *Bulimulus* are *terrestrial* snails, aestivating or hibernating in the ground, crawling on the ground or on plants in damp weather. There are three distinct types of apical sculpture, as follows:

¹ The only especial notices of the apical sculpture of *Bulimulus* which I have noticed are by the writer, *Nautilus*, viii, 1894, p. 35, and by Dall, *Proc. U. S. Nat. Mus.*, xvi, 1893. Martens also figures a few apices on the last plates of the " *Biologia*."

A.—Apex irregularly wrinkled or wrinkles dislocated, broken into granules. Subgenus *BULIMULUS* s. str.

All the species are South American and West Indian.

Bulimulus s. str., type B. *exilis* = *guadeloupensis*.

Leptomerus Alb., type B. *limnæoides*.

Rhinus Alb., type B. *heterotrichus*.

Plectostylus Beek, type B. *peruvianus*.

Scutalus Beek, type B. *proteus*.

Nesiotes Alb., type B. *nux*.

B.—Apex with vertical regular riblets. Subgenus *ORTHOTOMIUM*.

Species of Lower California and Northern Mexico, extending into U. S.

Sonorina Pils., type B. *spirifer* (*Leptobyrsus* C. & F., 1875, not *Leptobyrsa* Stal., 1873).

Orthotomium C. & F., type B. *sufflatus* (*Rabdotus* part, Alb., not *Rabdotia* Dej., 1833; *Globulinus* C. & F., 1875, not *Globulina* Orb., 1826. *Thaumastus* Auet. not Alb.)

Plicolumna Coop., type B. *ramentosa*.

C.—Apex smooth, rather mamillar. Subgenus *BOSTRYX*.

Species South American, mainly of Ecuador, Peru and Chili.

Lissoueme Pils., type B. *erythrostomus*.

Ataxis Alb., type B. *umbilicaris*.

Bostryx Trosch., type B. *solutus*.

Peronæus Alb., type B. *pupiformis*.

Geopyrgus Pils., type B. *turritus* (*Pyrgus* Alb. not Hübner).

The only group of *Bulimulus* extending into the United States is *Orthotomium*. This includes *schiedeanus*, *dealbatus*, *baileyi*, *montezuma*, *sufflatus*, *pilula*, *alternatus* and their allies. It is very characteristic of the Sonoran life-area, as originally limited by Merriam.

It is somewhat remarkable that in each of the three subgenera of *Bulimulus*, narrow, pupiform species have been independently developed.

Genus *Drymaeus* Alb., 1850.

(= *Goniognathus* Cr. & Fisch.; *Otostomus* Martens).

Arboreal snails, never found on the ground when living. Apical sculpture an extremely fine grating formed of vertical and spiral striae intersecting at right angles. Radula peculiar.

A.—Lip expanded or flaring.

Zoplugius Pils., type D. *navicula* (=*Otostomus* Martens not Beck & Gray; *Navicula* Spix not Blainv.).

Semiclausuria Pfr., type D. *semiclausus*.

Drymaeus s. str., types D. *xanthostoma* and *hygrohyaleus* Orb.

Neopetrieus Mts., type D. *altoperuvianus*.

B.—Lip simple, arcuate.

Mesembrinus Alb., type D. *virgulatus* Fér.

Eudiaptus Alb., type D. *pseudosuccineus*.

C.—Apical sculpture not distinctly grated.

Leiostracus Alb., type *D. vittatus* (not *Liostraca* Burm.).

The genus *Drymaeus* is represented within our limits by *D. serperastrus* in Texas, belonging to the restricted section *Drymaeus*, and in Florida *D. dormani* and *marielinus* represent a section perhaps requiring a new name. *D. multilineatus* belongs to *Mesembrinus*.

A certain number of Brazilian and Venezuelan forms, of which *D. vittatus*, the type of Albers' group *Leiostracus*, is an example, have superficial vermiculate wrinkles on the upper portion, excessively fine, often indistinct, spirals on the lower portion of the second apical whorl. This is quite different from the usual evenly grated sculpture. It is often very indistinct.

THE SIZE OF MUSSELS.

BY W. S. STRODE, M. D., LEWISTOWN, ILL.

Some time since, in conversation with an aged naturalist, I informed him that I had found a valve of *Unio alatus* Say, in Spoon River, Ill., that was nine inches long. He expressed surprise and said that he never saw a mussel of any kind over six inches in length, and, old as he was, he would walk five miles and go into water up to his neck to get a specimen above that size. Feeling a little taken back by his assertion, I determined to go home and make some measurements of my largest species of Spoon River Uniones. I was certain that I had several varieties that were above six inches in length. The following is the result of my measurements:

U. anodontoides Lea, length 7 in., circumference 9 in.

U. ligamentinus Lam., length 7 in., circumference 10½ in.

U. multiplicatus Lea, length $8\frac{1}{2}$ in., circumference $12\frac{1}{2}$ in.
U. rectus Lam., length 7 in., circumference 8 in.
U. tuberculatus Barnes, length $7\frac{1}{2}$ in., circumference $9\frac{1}{4}$ in.
U. plicatus Les., length $6\frac{1}{4}$ in., circumference $9\frac{1}{2}$ in.
U. graeili Bar., length 7 in., circumference 11 in.
Ano. grandis Say, length 8 in., circumference 12 in.
Marg. rugosa Bar., length 7 in., circumference 8 in.
Marg. complanata Bar., length $8\frac{1}{2}$ in., circumference 13 in.
 These were all from Spoon River, Ill.
Ano. stewartiana Lea, Ripley's Lake, Tex., $7\frac{1}{2}$ x 9.
U. rotundatus Lam., Ask Bayou, Tex., $5\frac{1}{2}$ x $8\frac{1}{2}$.

SMALL LAND MOLLUSCA FROM NEW MEXICO.

BY DR. V. STERKI.

A few days ago, Mr. Theo. D. A. Cockerell kindly forwarded me some small and minute shells of Mollusca collected in drift on the Rio Grande, at S. Marcial, N. M., with the request to publish a list of them with notes. The species were the following:

Hyalinula minuscula Binn.
Helicodiscus lineatus Say. One example.
Vallonia costata Mull. One example; this find is of peculiar interest.
Vallonia cyclophorella Ane. Rather small form; a few examples.
Pupa fallax Say.
Pupa arizonensis (Gabb.) W. G. Binney.
Pupa hordeacea Gabb. Rather small; variable in size and color.
Pupa proceru Gould. One example, light colored.
Pupa hordeacella Pilsb. Light colored to glassy transparent.
Pupa pilsbryana Sterki. One example; slightly more striated than those previously seen.
Pupa blandi Morse. A few; light color to colorless.
Vertigo ovata Say. Two specimens, rather typical.
 Besides these, there were a few examples of *Limnaea* and *Planorbis*.

New Philadelphia, Ohio, December, 1895.

THE GEOGRAPHIC DISTRIBUTION OF PLANORBIS UMBILICATELLUS.

BY E. G. VANATTA.

This species was first described by Mr. J. W. Taylor in the *Journal of Conchology*, 1883-85, Vol. IV, p. 351, under the name *P. umbilicatus*; but since Müller had previously described a *P. umbilicatus* in 1774, Cockerell renamed Taylor's shell *P. umbilicatellus* in the *Conchologist's Exchange*, November, 1887, p. 68.

It is now known from the following localities:

| | | | |
|------------|--|-------------------|---------------------------|
| Manitoba: | Brandon and Birtle, | R. M. Christy! | Original locality. |
| Minnesota: | Dallas Lake, Wright Co. | H. E. Sargent! | Coll. A. N. S. P. |
| | St. Michael's, | H. E. Sargent! | Coll. A. N. S. P. |
| Iowa: | Near Davenport, | H. A. Pilsbry! | Coll. A. N. S. P. |
| Montana: | Mingusville, | H. Squyer! | <i>Naut.</i> VIII, p. 65. |
| Colorado: | Davidson's Ranch, Boulder Co., J. D. Putnam! | Coll. A. N. S. P. | |

From these localities it seems to have a wide range through the northwestern States, the extreme points being Birtle, Manitoba; Mingusville, Montana; Davenport, Iowa, and Boulder Co., Colorado.

The shell is grayish-white, with a flat spire and a deep umbilicus. It may be easily distinguished from *P. parvus* Say by its deeper and narrower umbilicus and fewer whorls, and from *P. deflectus* Say by the flat spire, lack of blunt keel at periphery and the heart-shape of the aperture; *deflectus* having a rounded aperture.

No doubt this species will be found well represented in the collections of many western conchologists, unidentified or under the name "*deflectus*."

TRANSACTIONS OF THE ISAAC LEA CHAPTER.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

The annual election for officers occurs on the last Wednesday in December, and as Christmas for 1895 occurred on the same day, our election was postponed for one day. All the members of our Chapter residing in California were invited to be present at the home of the General Secretary on Thursday, December 26, to elect officers, as provided for in Article V of our Constitution. As our President, Professor Keep, lives five hundred miles from Los Angeles, he was

not able to be present, much to the regret of those present on that day. The Honorable Delos Arnold presided. A letter from the President was read, also one from Dr. M. L. Leach, one of the founders of our Chapter. It was hoped that Dr. R. E. C. Stearns, of the National Museum who is at present in Los Angeles, could meet with us, but his health would not permit him to be present. Mr. Arnold exhibited a fine *Pecten (Janira) floridus* Hinds from Santa Catalina Island, also, *Zonites milium* Morse from his own garden. They are the first reported from Los Angeles County.

The Secretary canvassed the votes sent in by mail, as well as those cast by the attending members. The result was as follows:

For President, Professor Josiah Keep, Mills College, California.

For General Secretary, Mrs. M. Burton Williamson, University, Los Angeles Co., California.

Before this number of THE NAUTILUS shall have been received, the volume of Transactions will be on its annual round to the members of our Chapter. Excerpts will, however, be published monthly in THE NAUTILUS, our Chapter organ.

Rules for the identification of shells were published in THE NAUTILUS some years ago, but many of the members of our Chapter may not have seen them. The following are the rules in substance: 1st. The number of species in one sending is limited to 12. 2d. The sender is to pay all expenses of transportation, and the specimens are to become the property of the Academy of Natural Sciences of Philadelphia. 3d. Each species must be numbered, so that identification may be given by number.

These same rules apply when identification is made elsewhere than at the Academy, only in this case they become the property of the one who names them. In sending shells for identification to the Secretaries of the various Sections, please bear these rules in mind. Label two sets of shells with the same numbers, retaining the duplicate set for reference when those sent for determination are reported to you.

We hope to have the best volume of transactions this year than the Chapter has compiled. A number of fine manuscripts are promised. The Chapter is in excellent condition as a working Chapter. This is the case because each member is in earnest, and because each one feels an interest in the welfare of the Chapter.

DREDGING IN LONG ISLAND SOUND.

[Report of Mr. A. H. Gardner. From the Transactions of Isaac Lea Conchological Chapter of the Agassiz Association for 1893.]

Of the species of bivalve mollusca given as dredged in Long Island Sound, all are common to the waters of New York Bay with the exception of *Pecten irradians* and *Modiola modiolus*. *Nucula proxima* has so far only been found by the writer in the curve of Sandy Hook Bay, the remaining species are more abundant in the bay than in the sound.

It must be remembered that the portion of the sound dredged in only constitutes a small section of it contiguous to New York City.

The *Odostomia* given as *bisuturalis* and *trifida* are probably one and the same thing; the distinguishing character being insignificant. The specimens dredged in Lloyd's Harbor are rather smaller than others, and apparently have a few more revolving lines. The calmer waters of the sound seem to favor the growth of many small species of univalve shells, uncommon in New York Bay, where their place is probably supplied by the larger species of *Natica* and *Fulgur*, which species are taken in almost every haul of the dredge in the bay, and are not found commonly in the sound.

List of localities and Mollusca dredged in Long Island Sound, July 15 to 22.

Hempstead Harbor, 2 to 4 fathoms, mud:

Eupleura caudata Say, 3; *Pandora trilineata* Say, 2; *Mulinia lateralis* Say, 9; *Area transversa* Say, 1; *Nucula proxima* Say, 12; *Yoldia limatula* Say 5.

Matinicock Point, 3 fathoms, mud:

Astyris lunata Say, 3; *Tritia trivittata* Say, 1; *Pandora trilineata*, 3; *Nucula proxima*, 34.

Plum Point, Oyster Bay Harbor, 3 to 4 fathoms; oyster beds:

Tornatina canaliculata Say 2; *Astyris lunata*, 8; *Urosalpinx cinereus* Say, 4; *Fulgur canaliculatum* Say (young), *Eupleura caudata* 7; *Solen americana* Gould (young), *Pandora trilineata*, 4; *Area transversa*, 7; *Nucula proxima* 21; *Pecten irradians*, 1.

Lloyd's Harbor, 2 fathoms; mud and eel grass:

Tornatina canaliculata, 35; *Bittium nigrum*, 29; *Odostomia trifida*, 36; *Turbanilla elegans*, 1; *Anachis avara* Say, 7; *Astyris lunata*, abundant; *Nassa obsoleta*, abundant; *N. vibex*, 2; *Urosalpinx cinereus* 1; *Eupleura caudata*, 15; *Pandora trilineata*, 1; *Mulinia lateralis*, 12; *Lyonsia hyalinia* Say, 2; *Tellina tenera*, 1; *Area transversa*, 3; *Nucula proxima*, 34; *Yoldia limatula*, 1; *Pecten irradians*, 2.

Huntington Harbor; shore:

Littorinella minuta, 2; *Litorina rufa*, abundant; *Odostomia bisuturalis*, 46.

Lloyd's Point, 5 fathoms, sand:

Lunatia triseriata, 1; *Tritia trivittata*, 2 (young); *Pandora trilineata*, 8; *Mulinia lateralis*, 4; *Area transversa* (young), *Nucula proxima*, 56; *Yoldia limatula*, 5.

Portchester Harbor, shore:

Area pexata, 1; *Modiolus modiolus*, 1; *Crepidula convexa*, 2; *Littorinella minuta*, 1; *Odostomia bisuturalis*, abundant; *Urosalpinx cinereus*, abundant.

NOTES AND NEWS.

TROCHOMORPHA FUSCATA Pease. This species was listed in *Man. Conch.* (2), IX, but, so far as I know, no description has appeared. It is allied to *nigritella* and *contigua*, but the umbilicus is smaller than either (one-eleventh to one-twelfth diam. of base); spire slightly-convex conic, the apex much more pointed than in *contigua*; base flattened as in *contigua*. Alt. 8 $\frac{1}{2}$, diam. 11 $\frac{1}{2}$ mm. Color uniform blackish-brown, or clear honey-yellow. It is from Ponape, or Ascension Island, near the Caroline group.

CALIFORNIA SLUGS.—Mr. Edw. M. Ehrhorn has lately sent me some slugs from California, which may as well be put on record. A box from Mountain View contained a number of *Amalia gagates* (syn. *hewsoni*) and one *Agriolimax campestris*, both, in my opinion, native species. A lot from San Jose, Sta. Clara Co., consisted wholly of introduced species, namely, *Agriolimax agrestis*, heavily mottled forms, and *Limax maximus*, young and old. The three adult *L. maximus* in the box were all different, one being of the form *marmoratus* Ckll., one *moquini* Ckll., and the other an ill-defined form nearest to *ezernaevii* Kal. These forms are like those which occur commonly in the southeast of England.

—T. D. A. COCKERELL.

SHELLS OF THUNDERHEAD MT., N. C.—I went to Thunderhead again last June, and I found two more specimens of *Gastrolonta patuloides* Pils., and more of the other new forms I had taken the year before [see *NAUTILUS*, p. 14]. I found, this time, what I think is a banded form of *Mesodon andrewsi* W. G. B. I have never seen this variety before. A few of the long-looked for *Mes. christyi* were found also, but they are very rare.

—MRS. GEO. ANDREWS, *in letter*.

THE NAUTILUS.

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No. 11

NEW FLORIDA UNIOS.

BY BERLIN H. WRIGHT, PENN YAN, N. Y.

Unio Hartwrightii sp. nov. Pl. II, figs. 4, 5, 6.

Shell smooth, elliptical, inflated, pointed or subtriangular posteriorly, well rounded anteriorly, inequilateral; rather thin and hard, slightly thicker in front; beaks very prominent, with two or three obscure wide undulations in one series; epidermis dark chestnut-brown with faint green rays, more or less disposed in fascicles over the entire disk; growth lines barely distinct; umbonal slope raised into an abrupt high ridge on the upper half, and rounded and flattened below; dorsal area wide, carinate, nearly cordate and usually with numerous heavy wrinkles or sharp folds; cardinal teeth double in the left and simple in the right valve, divergent, crested, rather short and subcompressed; lateral teeth long, striate and thin; nacre pinkish-purple and in concentric zones towards the margins, highly iridescent, and especially so on the posterior half; cavity of the umbones rather deep; posterior cicatrices confluent, anterior ones distinct, and the dorsal ones few and in a short line under the hinge plate.

Hab., Lake Beresford, Florida.

Types in the collection of the author, cabinet of Mrs. Geo. Andrews, Knoxville, Tenn. and Museum Acad. Nat. Sciences, Phila.

REMARKS.—Some fifteen specimens of this shell were taken in 1887, showing quite a disposition to variability, the sharp umbonal angle being more or less depressed, and the wrinkles less numerous and prominent. It does not group well with any species, but has some characters which, perhaps, suggest an affinity with *U. Anthonyi* Lea, under which name it has been sparingly distributed, but differs in being more rounded behind, rayed, in the color of epidermis, location of point of greatest diameter, prominence of umbones, elevation of umbonal ridge, and in the greater cavity of the shell and beak.

The specimen in the cabinet of Mrs. Geo. Andrews is a magnificent one, and was collected in Florida by the late Mr. F. Rugel. I dedicate this rare and beautiful species to my father, Dr. Samuel Hart Wright, A. M., Ph. D., who shared the delights of my Florida collecting tour, and whose counsel in the study of the Book of Nature, has always been an inspiration.

Another Florida *Unio* was given this name by the late Dr. Wesley Newcomb, but it was never published, its specific value being doubted.

Unio Oscari B. H. Wright. Pl. II, figs. 1, 2, 3.

The original description of this species may be found in *NAUTILUS* March, 1892, p. 124.

Habitat: A creek from Lake Oseeola, at Winter Park, Florida.

Collections of G. W. and O. B. Webster, B. H. and Dr. S. H. Wright, Museum Academy Natural Sciences, Phila., and National Museum.

Over 100 specimens of all ages of this well marked and beautiful species were taken by the Messrs. Webster and submitted for examination. They are remarkably uniform in character and most nearly related to *U. aheneus* Lea, from which it differs in having a smoother and nearly *polished* epidermis, cavity of the shell very much deeper and the lateral teeth shorter, heavier and wider. This shell has been needlessly confounded with *U. Hazelhurstianus* Lea of the Satilla River, Ga., from which it differs in being more roughly furrowed (sides deeply grooved near the umbonal ridge with *concentric rounded furrows*) more inflated, thinner, more pointed behind and more sharply angled on the posterior umbonal angle and in having a reddish-brown epidermis instead of black, and the teeth are much slenderer.

This species is here figured for the first time.



WRIGHT—New Unionidæ.

A NEW VARIETY OF LIMNÆA.

BY L. H. STRENG.

Limnæa desidiosa var. De Campi.

Shell oblong, subconic, pale horn color, subdiaphanous, very finely striated. Whorls about 5, rapidly enlarging, very convex and flattened; suture very deeply impressed, forming a considerable shoulder. Aperture about equal in length to the spire, not dilated, elliptical; subumbilicate. Labium but a small portion appressed to the body whorl, and the callus very light; sinus of the fold not very prominent. Length 5 mm., breadth 2½ mm.

Inhabits Brook's Lake, Newaygo Co., Mich.



Remarks: The shell is rather slender in appearance, its main features being the rapid enlarging of the whorls and the shoulder. It is most closely allied to *L. desidiosa* Say, except in the prominent shoulder, and it is a great deal smaller shell. It was discovered by Dr. De Camp several years ago, and has lain in our collection ever since. I name it after my friend Dr. De Camp, who has done so much for the furtherance of our knowledge of the Molluscan fauna of Michigan, especially the western part of the State.

Nov. 22, 1895.

DESCRIPTION OF A NEW GASTRODONTA.

BY H. A. PILSBRY.

Gastrodonta collisella n. sp.

Shell rather solid, minutely perforate, above elevated and somewhat dome-shaped, below rather flattened, the periphery rounded. Surface glossy, especially beneath, the base being radially finely wrinkled, and with faint traces of spiral striation in the slightly excavated umbilical region; upper surface sculptured with irregular, areuate wrinkle-riblets in the direction of growth-lines, and stronger toward the sutures. Whorls 7½, slightly convex, separated by very shallow sutures, which, under the lens, seemed margined below by the partial transparence of the shell.

Aperture mainly basal, lunate, with a lining of white callus a short distance within, heavier and bearing a small tooth on the columellar slope, and a rather short white lamella toward the outer part of the base. Lip-edge thin and acute, suddenly expanded at the columellar insertion, half covering the umbilical perforation.

Alt. 7, diam. $8\frac{1}{2}$ mm.

Alt. $5\frac{1}{2}$, diam. $8\frac{1}{2}$ mm.

Described from thirty-four specimens, from Knoxville, Tenn.; Citico, Monroe Co., Tenn. (A. G. Wetherby); Knox Co., Tenn. (Mrs. Geo. Andrews), and Nashville, Tenn. (G. A. Lathrop).

Variation is observed in the height of spire and the degree of development and length of the basal lamella. It is most nearly allied to *G. ligera* and *G. cerinoidea*, being smaller than the former, with different aperture armature, and larger, duller and more elevated than the latter.

My attention was first called to this form by Mr. A. G. Wetherby, although specimens from Nashville had long been in the collection of the Academy of Natural Sciences. It seems to be a fairly common species, probably confined to the "Cumberland Subregion" of Binney.

In describing this form, it is a pleasure to add that so competent an observer as Mr. Wetherby agrees with me that it is a new species; for I suppose no living naturalist is more experienced than he in dealing with the shells of the beautiful mountain region it inhabits.

NEW NORTH AMERICAN PISIDIA.

BY DR. V. STERKI.

Pis. trapezoideum n. sp.

Mussel of moderate size, rather much inflated, irregularly quadrangular in outline; beaks slightly posterior, rather large and prominent, more or less distinctly flattened on top; superior margin little curved, with the scutum and scutellum well developed and marked by distinct angles where joining the posterior and anterior margins; the former truncated perpendicularly, and with an obtuse, rounded angle where passing into the moderately curved and comparatively long inferior margin; antero-superior margin little curved or straight and meeting the inferior in a well marked somewhat

rounded angle situated rather inferior. Surface with irregular, rather fine striæ, slightly shining; color of epieonch pale or grayish horn; shell moderately thick; nacre whitish-glassy; hinge rather stout; cardinal teeth lamellar, the right moderately curved, not reaching the inferior edge of the hinge plate, with a rather deep groove below; the left anterior cardinal tooth moderately or rather strongly curved, the posterior oblique, moderately curved, with a deep groove between them; lateral teeth rather strong, finely crenulated or rugulose, those of the left valve strongly, those of the right valve slightly projecting over the valve edge, and the latter also into the cavity of the mussel; ligament strong.

Size: long. 4·2-4·7, alt. 2·5-3·0, diam. 2·5-3 mill.

Habitat. The species has a wide geographical distribution; Michigan, many places in the Upper and Lower Peninsula; southern Minnesota; Pedan River, Canada; Philadelphia, Pa.; Adamsville, N. J.; Comal Co., Texas.

It is surprising that such a well characterized *Pisidium* has not been noticed before this. Careful comparison with the earlier descriptions of *T. Prime* shows that it cannot be identical with any of those species.

Pis. trapezoideum is somewhat variable in size and shape; the angles at the scutum and scutellum are more rounded in some forms, and so the superior margin is more curved, the beaks are more or less flattened on top, sometimes almost imperceptibly.

New Philadelphia, Ohio, February, 1896.

(To be Continued.)

ANNOTATED LIST OF THE MOLLUSCA FOUND IN THE VICINITY OF
CLEARWATER, WRIGHT CO., MINNESOTA.

BY H. E. SARGENT, WOODVILLE, ALA.

Part Second—Aquatic Species.

In searching for aquatic specimens a ten quart tin pail and a wire gauze dip net were the implements made use of. Sediment and specimens were dipped into the pail and washed by repeated stirring and decantation. By this means the most minute specimens were retained for future sifting and sorting.

The stations searched have been fully described and located in the first part of this article. They will be hereafter referred to by letter as follows:

Station B. Belle Lake.
Station C. Clearwater Lake.
Station D. Mississippi River at Bellevue, Ia.
Station F. Clearwater River.
Station H. Heath Lake.
Station M. Mississippi River at Clearwater, Minn.
Station R. Crow River, Rockford, Minn.
Station S. A dry meadow at St. Michaels, Minn.
Station T. Among damp moss in tamarack swamp at Clearwater, Minn.

39. *Plenocera subnare* Lea. M.
40. *Bythinella obtusa* Lea. M.
41. *Amnicola lustrica* Pils. B, C, H, in all cases feeding upon weeds.
42. *Amnicola limosa* Say. B, C, F, R, M, H.
43. *Amnicola limosa* Say var. *porata* Say. M.
44. *Amnicola cincinnatensis* Anth. R.
45. *Valvata tricarinata* Say. B, F, M, H, R, T, C.
46. *Valvata tricarinata* Say var. *bicarinata* Lea. B, F, H, R, T, C.
47. *Valvata tricarinata* Say var. *simplex* Gld. C.

Notes.—Typical specimens occurred alone in the Mississippi River only. Of 132 specimens taken from there, none show any tendency toward the varieties. The carine are very prominent; specimens mostly large and dark colored. At all the other stations, specimens were much smaller, light in color and only in exceptional cases having three distinct carine. In most cases the middle one is entirely wanting. The few specimens taken at Clearwater Lake are about equally divided among the three forms.

48. *Lyogyrus browni* H. F. Carpenter. B, F, in muddy bottom.
49. *Campeloma rufum* Hald. F, M. 3 sinistral specimens of this species were taken.
50. *Campeloma subsolidum* Anth. D. Adult specimens are curiously depressed, closely resembling *Viripara subpurpurea* Say with which it is found.
51. *Viripara subpurpurea* Say. D.

52. *Viripara intertexta* Say. D.

53. *Limnaea megasoma* Say. The only station for this species in this vicinity, so far as known, is a small lily-pond in the bed of the Mississippi River just below St. Cloud. It was discovered here a few years ago by Prof. Hubbard of the St. Cloud State Normal School. The snails are to be seen floating on the surface or feeding upon the lily-leaves. They are shy, sinking almost instantly when alarmed.

54. *Limnaea stagnalis* L. C, H, B, feeding upon weeds. R, found putrifying at the roots of grass in slough near the river.

55. *Limnaea emarginata* Say. C. Two quite distinct varieties of texture were taken. One corneous, translucent and rather thin in both young and adult specimens; the other nearly white, opaque and heavier, with much thickened margin. Both forms were plentiful and near together. One was found on the pebbles, the other on the sandy bottom.

56. *Limnaea gracilis* Jay. After finding dead specimens of this beautiful species in Belle Lake, I was told by Prof. Hubbard that he took it alive in Heath Lake the previous fall upon the under side of lily-leaves. Later a thorough search was made for them in the same original locality, but only two dead specimens were found. Query—where do they keep themselves in summer?

57. *Limnaea reflexa* Say. C, B, S.

58. *Limnaea reflexa zebra* Tryon. B.

59. *Limnaea columella* Say. R.

60. *Limnaea eutascopium* Say. M.

61. *Limnaea caperata* Say. S.

62. *Limnaea palustris* Mull. R, on slough grass; D.

63. *Limnaea humilis* Say. C, B, M, F.

64. *Limnaea desidiosa* Say. C, B, M, F.

65. *Aplexa hypnororum* L. R, T, S.

66. *Physa gyrina* Say. D, F, B, M.

67. *Physa integra* Hald. St. Cloud, Minn.; D.

68. *Physa olueca* Tryon. D.

69. *Physa rimosi* Gld. F.

70. *Planorbis campanulatus* Say. Abundant everywhere.

71. *Planorbis bicarinatus* Say. Abundant everywhere.

72. *Planorbis tricarinatus* Say. Abundant everywhere.

73. *Planorbis exaeetus* Say. C, B, R, F, H.

74. *Planorbis hirsutus* Gld. C, B, T, F, H.

75. *Planorbis umbilicatellus* Ckll. B.

76. *Planorbis parrus* Say. B, T, F, D.

77. *Segmentina armigera* Say. Everywhere abundant.

78. *Aneylus* (sp.?). M, D.

79. *Sphaerium sulcatum* Lam. B, F, H. Mississippi River at St. Cloud. Specimens extra large and fine.

80. *Sphaerium striatum* Lam. R, F, D, M.

81. *Sphaerium transversum* Say. D.

82. *Sphaerium truncatum* Linsley. R, F, S, B, F.

83. *Sphaerium rhomboidatum* Say. B, H. Mississippi River at St. Cloud.

84. *Sphaerium solidulum* Prime. M, F.

85. *Sphaerium Jayatum* Prime. Marshes near Clearwater.

86. *Sphaerium securis* Prime. H.

87. *Pisidium virginicum* Gmel. F.

88. *Pisidium abditum* Hald. F, H, B, T, C. Spring at Bellevue, Iowa.

89. *Pisidium Walkeri* Sterki. F, M.

90. *Pisidium politum* Sterki. F, B.

91. *Pisidium variabile* Prime. F, C, H.

92. *Pisidium compressum* Prime. F, M, C.

93. *Pisidium ferenginum* Prime. F, M, H.

94. *Pisidium rotundatum* Prime. B, T.

95. *Unio occidens* Lea. M.

96. *Unio reticulatus* Lam. C, M, F. Red River of the North, Fargo, N. D.

97. *Unio luteolus* Lam. C.

98. *Unio ligamentinus* Lam. M.

99. *Anodonta footiana* Lea.

The *Pisidia* enumerated above are certified to by Dr. Sterki; the *Sphaerium* by Mr. E. W. Roper; and such other species as there was any doubt concerning by Prof. H. A. Pilsbry.

TRANSACTIONS OF THE ISAAC LEA CHAPTER.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

Owing to the delay of some of our reports the volume of Transactions was not started promptly on its annual round, but we hope our members will make allowance for the delay. The volume will

be found interesting and suggestive. Extracts from the Transactions will be found in this department of THE NAUTILUS each month.

A member who has joined our Chapter during the year, writes the following when forwarding her report for 1895: "I did it only because I understood that was the one thing that would insure me the privilege of reading the 'Transactions' for the year. I have read those of 1889 and 1891, and am willing to do anything in my power for the pleasure and profit of reading another volume." Please bear in mind that one week is the limit of time allowed for the retention of the volume of Transactions.

The Secretaries of Sections for our Chapter have been appointed, as provided for in Section 1, of our By-Laws, and are as follows:

Section A.—Marine shells of the West Coast, Prof. Keep, Mills College, Cal.

Section B.—Mrs. E. P. Wentworth, Portland, Maine.

Section C.—Land shells east of the Rocky Mts. (Secretary not yet chosen).

Section D.—Fresh water shells east of Rocky Mts., Dr. W. S. Strode, Lewistown, Ill.

Section E.—Land and fresh water shells west of Rocky Mts. (Secretary not yet chosen).

Section F.—Fossil shells, Hon. Delos Arnold, Pasadena, Cal.

Section G.—Juvenile Section, Mrs. Mary P. Olney, Spokane, Wash.

Section H.—Microscopic shells, Mrs. T. S. Oldroyd, Los Angeles, Cal.

Section I.—Marine shells of the S-Eastern Coast, Mr. J. J. White, Rockledge, Florida.

The Executive Committee consists of the "President, General Secretary and one other member" (Art. IV). The Honorable Delos Arnold has been appointed a member of the Executive Committee.

WEST COAST SPECIES OF HALIOTIS.

[Report of the President, Professor Josiah Keep. From the Transactions of Isaac Lea Chapter for 1895.]

The recent revision of the genus *Haliotis* and the changes of some specific names since the publication of my little book on West Coast

Shells, make it proper to place the matter anew before the members of our Chapter. Those who have the opportunity of consulting Vol. XII of the "Manual of Conchology," will find a full discussion of the subject; but as there are some who cannot consult that excellent authority, I propose to use some of the statements of Prof. Pilsbry in connection with this report.

There are six species of the genus in question to be found upon our Western Coast, only three of which, however, are sufficiently abundant to be called common. The first of these species, and probably the best represented in respect to the number of specimens, is *Haliotis Cracherodii* Leach. This is the common "black abalone," so called on account of the dark color of the outer layer of its shell. The "Manual" gives the limits of locality as "Fallarones Is. to San Diego." Probably the Farallones Is. off San Francisco are meant, a natural mistake having been made in the spelling, but I think the species reaches much farther to the northward than the latitude of these islands. I should like to have my suspicions confirmed or refuted by those who have made northern observations.

One morning during the last summer I took advantage of the low tide and explored the granite rocks that form the promontory beyond the Point Pinos lighthouse near Monterey. The waves have been breaking for ages over those venerable cliffs, and the results of their work are distinctly seen. Out in the water, quite far from land, you get glimpses of sunken rocks, the very bones of the ancient cape. Nearer are a series of small and precipitous islands, most of which you can reach at low tide. Strewn all over the bases of the cliffs are masses of granite, some of them loose boulders, while others are the seamed and weather-worn outcroppings of the underlying ledges. Many of the rocks are covered with a thick mat of seaweed, but others are gray and bare.

Venturing out as far as safety would allow, I was amazed to find the available roosting on some of the cliffs almost literally covered by young specimens of the species under consideration. The shells averaged, perhaps, three inches in length; a few were twice that size, but many were much smaller. Their keen instinct teaches these animals to seek the least exposed positions, a deep and narrow cleft in the rock being the favorite retreat, and there, away from danger, they congregate in great numbers. As the tide came in I was obliged to leave them, and so could not continue my observations, but I fancy that when they were well covered with water they loosened

their firm hold upon the surface of the rock and began to move around in search of food. It is evident that this species is very prolific, and though large specimens are not so common as formerly, there seems to be no danger that the species will soon become extinct.

The next species is the red abalone, *H. rufescens* Swainson. This animal has a much larger shell than the last, some of them reaching the length of nine or ten inches, possibly more. They were formerly very common about Pacific Grove, but they have been so persistently collected that adult specimens are rarely found. They live at a somewhat lower level than their black brothers, and are not often seen on the rocks above the water, even at low tide. The Chinese fishermen cruise around in their boats at such times armed with a hook on the arm of a long pole, with which they secure the coveted prize. The large shells are mostly collected from the more unsettled parts of the coast, and there is danger that the supply will soon become seriously diminished. Last summer I saw a two-horse wagon loaded with these shells, which had been drawn up to Pacific Grove from a point some thirty miles down the coast.

The third species, named from its beautiful internal color the "green abalone," has generally been known to scientific circles as *Haliotis splendens*. It was given that very appropriate name by Reeve in 1846, but it has been found that in 1845 it was named by Philippi *H. fulgens*, and so the latter name must stand. This beautiful shell abounds in southern waters, but as I have never had an opportunity to study its habitat, I cannot report upon its prospective decrease. The only live one I ever saw was an aged specimen which was found upon the rocks near Cypress Point. Monterey Bay seems to mark its extreme northern location, and even then I have never found a specimen in the Indian shell-heaps, though *rufescens* and *Cracherodii* are found by the thousands in all stages of decomposition.

H. corrugata Gray, does not come so far north as the last species. A fine specimen before me from San Pedro, Cal., measures 6½ in. in length, 5½ in. breadth, and 2½ in. convexity. The shell has strong ridges upon its back, and there are four large open holes. I have never seen a living specimen, and know very little concerning its habits.

H. assimilis Dall, is now considered to be a distinct species. The Manual reports it from "Monterey to San Diego in deep water." A

specimen before me from San Diego is 4 inches long and $3\frac{1}{4}$ inches wide. It has seven open holes. The exterior of the shell is marked by many threads like Brussels carpeting, and the spire is short but distinct. The interior is smooth, silvery, and without visible muscle-scar. The shell is tolerably thick, and appears very compact and solid.

The last species to be noticed is *Haliothis gigantea* Chem. var. *Kamtschatkana* Jonas. The large typical form of this species belongs essentially to Japan, but the variety seems to have come around with the warm current past the Aleutian Is., and down the coast, at least as far as the middle of California. My best specimens I purchased in Victoria, B. C., where I was told that they were gathered on the west coast of Vancouver Island. My largest specimen is 5 inches long, $3\frac{1}{2}$ inches wide, and $1\frac{1}{2}$ inches high. In shape it appears long and narrow when compared with other species. The shell is thin, the edge sharp, the spire quite prominent, the surface uneven, and the open holes are four in number, large and surrounded by high walls. A deep channel runs under the line of holes. The interior is very iridescent, light color prevailing. The muscle-scar is not distinct.

Concerning at least half of our species there is need of further information respecting the habits of the living animals, as well as observations concerning localities where specimens are to be found. In the gathering of information of this kind, even about our more common species, I believe the members of our Chapter may be able to do much good work. While a few great men may do the important work of determining the correct names and classification of the species, each one of us in our more humble sphere may make observations and collect information which will help to swell the total amount of knowledge concerning the molluscan world. I shall personally be grateful for any further information concerning any of our species of the genus *Haliothis*.

HOW TO PACK SPECIMENS FOR MAILING.—Three times within the last few days I have received small sendings in which the specimens were crushed to powder. It is too unsafe to send shells in a letter, simply packed up in paper or a paper tube, or weak quill. Strong turkey quills are better, especially when double, *i. e.* one tightly stuck into another, and fastened in the bottom of the envelope. Also a piece of thick pasteboard, or a slice of cork is suitable, with a hole in the middle, and paper pasted on both sides.—It is a pity how often valuable and even unique specimens are lost by carelessness in packing.—DR. V. STERKE.

THE NAUTILUS.

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No. 12

NEW AMERICAN UNIONIDÆ.

BY BERLIN H. WRIGHT, PENN YAN, N. Y.

Unio bursa-pastoris sp. nov. Pl. III, figs. above and below.

Shell rough, disposed to be both nodulose and pitted, very inequilateral, rounded evenly in front, unibarial ridge nearly obsolete, dorsal margin arenate, ligament long, thick and much elevated, epidermis reddish-black, rayless, except when very young; substance of shell thick; cavity of shell shallow and uneven, with a wide flattened area extending from beak cavities to the posterior angle; cavity of the beaks very deep, compressed and very wide; pallial impression very rough and deep; greatest diameter of shell over the anterior edge of the cardinals; cardinal teeth low, thick and rather smooth; lateral teeth short, thick and widely separated from the cardinals; dorsal plate long, wide and usually notched near the cardinals. Terminal cicatrices distinct; dorsal cicatrices numerous, shallow and under the posterior cardinal. Nacre white and usually much blotched with smoky spots; occasionally with a shade of pink in the center of the cavity.

Size, length 2·5 inches, width 3·6, diameter 1·25.

Hab. Powell River, Virginia.

My Cabinet, National Museum and Mus. Acad. Nat. Sci., Phila.

Remarks.—This species belongs to the group of which *U. argenteus* Lea is typical. It differs from that species in having a darker

epidermis, an obsolete umbonal ridge and deep, compressed beak-cavities. It differs in much the same manner from *U. Lesleyi*, which has greater shell cavity. Compared with *U. abaeus* Hald., it is proportionally much wider, deeper and with more compressed beak-cavities, and has not the checker-board markings of that species. Old specimens resemble *U. Pilsbryi* Marsh, interiorly, but without alation or undulations. In old specimens the base becomes emarginate, and there is more or less biangulation behind, and the teeth become almost obsolete, and of a dull smoky tinge. Thirty specimens were received.

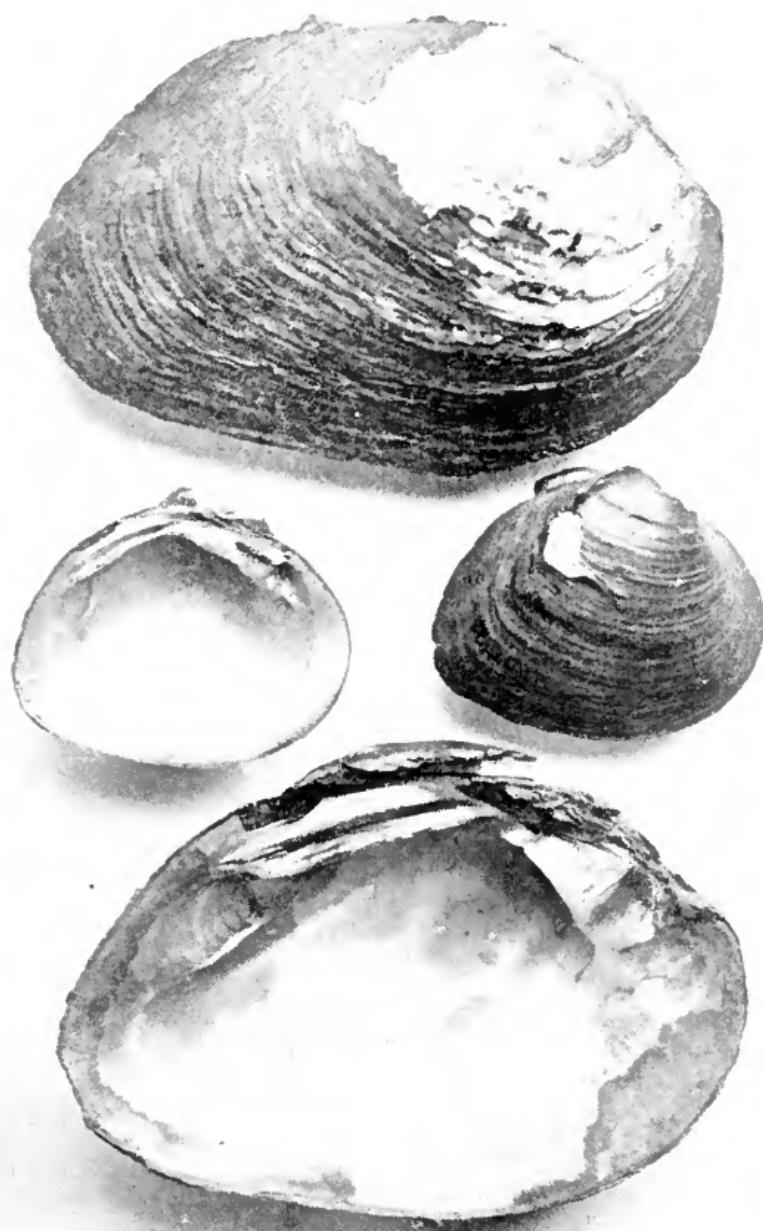
Unio Friersoni sp. nov. Pl. III, figs. right and left.

Shell smooth, triangular, inflated, nearly equilateral, obtusely pointed behind; sides swollen not constricted, rayless or obscurely radiate when very young; substance of the shell uniformly rather thick and solid. Beaks angular to the tips and with three or four close undulations which form parallel V-shaped ridges with the angle pointing down the umbonal angle, and the long straight arms of which extend diagonally across the beaks. Ligament very short, thin and of a lighter red than the epidermis, which is a dark-chestnut color, with minute striae and with coarse growth-lines. Umbonal slope obtusely angular. Posterior slope rounded on the margin and with a raised ridge line from beak to posterior end, forming there, generally, a slight biangulation. Dorsal area wide, cordate. Cardinal teeth large, erect, with furrowed sides, the anterior branch in the left valve being very thin and broad and with a long striate edge. Lateral teeth short, slightly curved, the outer one being the thinner. Anterior cicatrices distinct with a secondary cicatrix above, and running under the cardinal tooth. Posterior cicatrices distinct. Dorsal cicatrices few and under the posterior cardinal. Cavity of the shell very deep, and quite uniformly hollowed out. Cavity of the beaks broad, roomy, the apex within being nearly a right angle. Nacre usually white, with a tint of blue, and iridescent at posterior end; sometimes the nacre is entirely pink.

Animal always white. Size, width 2 inches, length 1.75, diameter 1.38.

Habitat Bayou Pierre, an arm of the Red River in De Soto Parish, Louisiana.

My Cabinet, U. S. National Museum, Academy of Natural Sciences, Phila. and cabinet of L. S. Frierson.



Unio bursapastoris Wright.
Unio Friersoni. Unio Friersoni Wright.
Unio bursapastoris Wright.

Remarks.—This species belongs to the group of which *U. trigonus* Lea, may be considered the type, although differing much from that species in outline, beaks and in the uniform roundness of the sides. It also has certain characters indicating a relationship with *U. Ridellii* Lea, *U. Chunii* Lea and *U. cuneus* Con. It differs from the first in having the posterior apex lower and more or less biangulated; the posterior margin rounded, instead of straight; posterior margin without the hip peculiar to *U. Ridellii*; the cardinal teeth are heavier and not pyramidal; and differs most remarkably in the character of the beak undulations. From *U. Chunii* Lea, it differs in having a greater depth of cavity; more massive and higher umbones and swollen sides without depressions; much shorter posterior extension; base not emarginate; entire absence of rays and the same difference in beak undulations that distinguishes it from *U. Ridellii* Lea. It differs from *U. cuneus* Con. in being smoother; lighter colored epidermis; much larger opening to the umbonal cavity; cavity of the shell much deeper and more uniformly rounded; lateral teeth more slender and the species never attains the extreme size of *U. cuneus*, the declivity of the posterior slope is much steeper; the ligament shorter; without the anterior subtruncation, and it is never cuneiform.

The peculiar undulations of the beaks amply distinguish it from any other known species.

Some twenty-five specimens have been critically examined which maintain a remarkable constancy in all the characters.

It is named in honor of Mr. Lorraine S. Frierson of Frierson Mill, La. who is a zealous student and collector of Unionidae.

ON CERTAIN ABNORMAL SPHÆRIA.

BY BRYANT WALKER, DETROIT, MICH.

The peculiar characteristics of the hinge-teeth of the American species of *Sphaerium* and *Pisidium* have been almost totally ignored by Prime and the earlier writers in their descriptions of the various species which they established. With the exception of some of the descriptions of the more recently described species, nothing but the most general remarks upon the subject are to be found in the American literature upon these genera. Among the European concholog-

ists, however, more attention has been given in this direction, and while perhaps some have gone to the other extreme and have accorded too great importance to the hinge characters, there can be no doubt, but that a careful and conservative study of our American species in this regard would be in many cases a valuable assistance to the determination of the relations and specific validity of many of the at present poorly defined and ill-understood forms.

In examining some specimens of the common *Sphaerium striatum* Lam. recently, I was struck in several instances with the occurrence of an abnormal arrangement of the hinge teeth, and was thereby induced to go further and ascertain if possible to what extent such irregularities were present.

My observations thus far have been confined to two species, *Sphaerium striatum* Lam., and *S. simile* Say. Of the former species one hundred specimens from twenty-four localities, were chosen at haphazard, the number from each locality varying from one to eleven. Of these, all the specimens from sixteen localities, forty-six in number, were normal. Of the remaining fifty-four specimens from eight localities, ten were abnormal. In only one instance, did more than a single abnormal individual occur in any one locality, and in that, three out of nine specimens were abnormal and all in the same particular.

Of *Sphaerium simile* Say, sixty-four specimens from nineteen localities were examined, the number from each locality varying from one to six. Of these, ten individuals out of thirty from eight different localities were abnormal. While in those from eleven localities, represented by thirty-four specimens, no variation occurred. In both species the number of abnormal specimens seems surprisingly large, amounting to ten per cent in *S. striatum* and to nearly sixteen per cent in *S. simile*. In no case was any attempt made to pick out unusual specimens and, indeed, no external variation in appearance was noticed as being coincident with the abnormal arrangement of the hinge.

The normal arrangement of the hinge-teeth of a *Sphaerium* is as follows:

| | | | |
|-------------|-------------|-----------------|-------------------|
| Right valve | Cardinal 1 | Ant. laterals 2 | Post. laterals 2. |
| Left valve | Cardinals 2 | Ant. lateral 1 | Post. lateral 1. |

The variations noticed consisted in the reversing of the position of one or more pairs of these teeth.

Of the seven possible variations from the normal arrangement, but four were noticed. In no case were the cardinals alone reversed, but invariably a reversal of these teeth was accompanied by a reversal of either one or both pairs of laterals. Neither were the cardinals and posterior laterals alone, nor both pairs of laterals alone reversed in any case. The following table gives the details of the different variations observed and their relative frequency.

Normal *Sphaerium*—cardinals $\frac{1}{2}$ Ant. Lat. $\frac{2}{3}$ Post. Lat. $\frac{1}{3}$.

Abnormal *S. striatum* Lam.

No. of specimens 22: Cardinals $\frac{1}{2}$ Ant. Lat. $\frac{1}{2}$ Post. Lat. $\frac{2}{3}$.

No. of specimens 32: Cardinals $\frac{2}{3}$ Ant. Lat. $\frac{1}{2}$ Post. Lat. $\frac{2}{3}$.

No. of specimens 22: Cardinals $\frac{2}{3}$ Ant. Lat. $\frac{1}{2}$ Post. Lat. $\frac{1}{3}$.

No. of specimens 32: Cardinals $\frac{1}{2}$ Ant. Lat. $\frac{2}{3}$ Post. Lat. $\frac{1}{3}$.

Abnormal *S. simile* Say.

No. of specimens 52: Cardinals $\frac{2}{3}$ Ant. Lat. $\frac{1}{2}$ Post. Lat. $\frac{2}{3}$.

No. of specimens 32: Cardinals $\frac{1}{2}$ Ant. Lat. $\frac{1}{2}$ Post. Lat. $\frac{1}{2}$.

No. of specimens 22: Cardinals $\frac{1}{2}$ Ant. Lat. $\frac{2}{3}$ Post. Lat. $\frac{1}{3}$.

NEW AMERICAN ANCYLIDÆ.

BY HENRY A. PILSBRY.

Owing doubtless to the difficulty of distinguishing species in this group, but little work has been done upon the United States forms since the publication of Haldeman's monograph in 1842. Clessin, in the "Conchylien Cabinet," has added nothing of value to our knowledge of United States species, his *A. oregonensis* from Salem, Oregon, of which I have "topotypes," being doubtfully distinct from Tryon's *A. fragilis*. *A. caurinus* is also, as Tryon states, a synonym of *fragilis*.

In naming a series of Illinois mollusks for the Illinois State Laboratory of Natural History, my attention was directed to this genus.

The species of *Aneylus* fall into two groups, not, I suppose, of much importance systematically, but of considerable interest in a broad view of the conditions of mollusk life. One group, which may be termed the "petrophilous" *Aneyli*, live on rocks and shells in rivers, and usually have a rather highly conic shell. The other group, "phytophilous" *Aneyli*, live on water plants; some deeply submerged, as on the "leaves of grass" (to use a Walt. Whitmanism), streaming upward from the bottom; others inhabit the round

under-world of floating lily-pads; sometimes they are found on dead leaves in the water. The species of this group are mainly more fragile and depressed than those of the first group, and sometimes they are modified to correspond with their stations, as *A. parallelus*, living on narrow stems. It is evident that this difference of station means also more or less difference of food; and it will be interesting to find whether there exists any corresponding divergence in the dentition. The importance of full information on the *station* of every lot of *Ancylus* collected, will be evident from the foregoing.

Nearly all specimens when collected, are more or less coated with foreign matter, sometimes calcareous, but generally ferruginous. This must be removed before the color and finer sculpture can be observed. By floating the shell a short time on the surface of a weak solution of oxalic acid, rinsing it in water and then brushing, it may readily be cleansed. Nearly all North American species are then seen to be a clear corneous-white tint; most of them have growth-lines only, a few have radial striæ. Most of those species which have been described as dark colored, such as *A. obscurus* Hald., owe their color entirely to foreign matter, the shell itself being very pale.

Exhaustive comparisons with specimens of all North American species, and the types or author's examples of most of them, convince me of the novelty of the following species.

Ancylus peninsulae Pilsbry & Johnson, n. sp.

Shell thin and fragile, with much depressed, broadly oval contour, the obtuse, rounded summit somewhat to the right of and behind the middle. Anterior, posterior and right slopes of the low cone nearly straight; left slope slightly convex. Color light horny brown, with a suggestion of olive when cleaned, usually with a very light brownish coating in a state of nature. Surface with slight, fine growth-lines and close, fine and conspicuous radial strike.

Length 7, width 5, alt. 1.7 mill., often larger.

St. John's River and other localities in Florida, usually in creeks, living on the foliage of aquatic plants.

Somewhat like the northeastern *A. fuscus*, but readily known from all other species of the United States by its large size, broadly oval and depressed form, blunt apex, and the dense radial striation. Several Antillean and South American species are somewhat similar to this, but these large and depressed forms have the apex far more excentric.

This is by no means rare in collections of fresh-water shells from Florida, but is generally labelled "*A. filosus* Conrad," probably on account of the conspicuous radial sculpture. Conrad's *filosus*, however, is a stout, very steeply conical species with coarser radial riblets than any other known American form, and totally different from the low and delicate *A. peninsulae*. It is from the Alabama River, where it is found living on Melanians. This fact, together with the texture and form of the shell, indicate that *filosus* is a typical rock *Ancylus*, like *rivularis*; while the form from Florida is a true weed dweller.

The types of *A. peninsulae* were collected by the editors of this journal in Salt Creek, one of those sparkling streams of "sulphur water" so characteristic of Florida, arising from great brimming springs and feeding the St. John's and other rivers. Salt Creek is the northernmost stream flowing into Lake George on the west side. The *Ancylus* lives on long water-grass, and is abundant.

***Ancylus eugraptus* Pilsbry, n. sp.**

Shell rather fragile, oval, the right side less arcuate than the left; rather elevated, the apex slightly behind and to the right of the middle, somewhat obtuse, with an indistinct apical depression or scar, posterior and right slopes straight, anterior and left feebly convex. Translucent horn colored and glossy when cleaned, with a blackish coating when collected. Surface with faint growth-lines and very fine, somewhat irregular radial striae, more distinct toward the periphery. Length 6, breadth 4, alt. 1.8 mm.

Illinois River at Havana, Ill.

Types are no. 67791, coll. A. N. S., Phila., from lot no. 13542, coll. Ill. State Lab. Nat. Hist.

This species, while resembling *A. obscurus* and *A. fuscus* somewhat, differs from both in the sculpture. The apex is far more eccentric than in *A. borealis* or *A. ovalis*, both of which are very small species. *A. filosus* is far rounder, more steeply conic, and has stronger radial riblets. In *A. rivularis* the apex is much more strongly recurved, and the slope behind it notably concave.

ISAAC LEA DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association by its General Secretary, Mrs. M. Burton Williamson.]

One of our new members in a letter to the General Secretary writes as follows in reference to collecting Mollusks in Winter in

California: "I have discovered that the sunshine has much to do with finding shells, as they come up much more readily on a warm day than on a cold cloudy one. Even these little creatures appear to love the sunshine." Is this the experience of other collectors during the winter?

ALONG THE DAMARISCOTTA.

[Report of Mrs. E. P. Wentworth. From the Transactions of the Isaac Lea Conchological Chapter for 1895.]

The banks of one of the loveliest rivers in Maine have been the principal scene of my "shelling trips" this year, and I shall make these trips the basis of my report. The first warm days in May found me taking advantage of the low tides. I was not sanguine enough to hope to find new species, and the object of my search was merely to lay in a store of *Natica heros* var. *triseriata*, *Nassa obsoleta* (large uneroded specimens) and to find, if possible, the *Skenea planorbis* which so far, has eluded my diligent search. Armed with a wooden tooth-pick, collecting bottle and tin dish, I advanced upon the unsuspecting mollusks. I found quantities of *Naticas* underneath the sea-weed, crawling on the surface of the mud which coated the rocks covered by the sea-weed, and thousands of *Nassas* crawling on the mud near the low water mark. The *Nassa* in the water were waving their siphons in the air as if signaling to one another, but I knew they were only feeding in their own peculiar fashion. On turning over some small flat stones near low water mark my cup of joy ran over, for there, clinging to the edges and under sides of the stones, were the long looked for *Skeneas* and associated with them many of the graceful little *Rissoa minuta*.

At this period of my search the wisdom of taking a wooden tooth-pick instead of a larger and more dangerous weapon was impressed upon me, for it was the most convenient instrument imaginable for transferring these tiny mollusks to the collecting bottle. Before the tide turned I had hundreds of specimens, but, better than the shells was the consciousness that now I knew where to find *Skeneas*. I also found an *Aemae testudinalis* Müll. clinging to an old bone, and although it was only moderate size and so fragile that I broke the edges in dislodging it, I carried it home in triumph, for it was the first one I had found in this river.

In July, my husband (who shares my studies with me) and I went up the river to a rocky point a short distance beyond the place where I found the *Skeneas* and here we tried our hand-net. Our efforts were rewarded by a live *Lyonsia hyalina* Conr. Our surprise and delight were unbounded. Never before had we even thought of *Lyonsia* as living so far from the sea (15 miles or more), and on a muddy bottom. This added another species to the many we had already found in this river. Repeated dredgings with the hand-net brought us no more *Lyonsias*, but on a careful examination of a small patch of mud at low water mark, covered with a hairy green sea-weed we discovered the hiding place of the fragile *Haminea solitaria* Say, and our diligent search resulted in our finding six of these transparent dainty shells. These the first we ever found alive, although in the bay at the headwaters of the river two miles away, I have found quantities of the dead shells. I am not aware that *Haminea solitaria* has ever before been found in Maine. It is a southern species and is not found in boreal waters. Its presence here along with several other distinctively southern species is regarded as evidence that the water bathing the coast of Maine was once much warmer than now, and these mollusks are the survivors of a fauna now nearly extinct in Maine.

On another trip, a short distance down the river, our net brought up a dead shell of *Nassa trivittata* Say.

As a result of this Summer's work along the salt water I have added four species to my list of Damariscotta River shells: *Lyonsia hyalina* Conr., *Aemona testudinalis* Müll., *Skenea planorbis* Fabr. and *Nassa trivittata* Say.

But the river banks are not the only localities in this vicinity rich in mollusean treasures. On a trip to a brook in South Newcastle we found forty-one specimens of *Margaritana arcuata* Barnes. A second visit to the same locality gave more *Margaritana*, *Sphaerium partumatum* Say, *Ancylus rivularis* Say, and one *Limnaea* which I have not yet determined. While waiting for our train we found a number of fossil shells in clay which had been unearthed by men who had been getting gravel for the railroads. The shells found in this clay were all bivalves, and did not seem to be at all like the shells common to this period or locality. One shell somewhat resembled *Lyonsia hyalina* but it had numerous teeth in the hinge like the *Area*.

Picture to yourselves a wide, shallow brook bordered on either side with tall, beautiful flowering grasses, the brilliant cardinal flower and delicate lavender flowered mints, and you will have some idea of the scene of loveliness which awaited us, after our nine mile drive to South Jefferson, one fine day in August. The brook, which is called Dyer's River, is rich in Molluscan life, and quantities of *Unio complanatus* were to be found there. The dead shells of *Margaritifera arcuata* were strewn along the banks, where they had been left by the pearl hunters. After collecting all the *Unio complanatus* we desired we used our hand-net with good success and the following shells were the result of the dredging: *Campeloma decisum* Say, *Pisidium aquilaterale* Pr., *P. rotundatum* Prime, var. *torquatum* Sterki, *P. abdutum* Hald., *Amnicola limosa* Say.

My best hunting ground for land shells this Summer has been the crevices of an old ledge, and an old cellar where trees grow out of the cellar floor. In the cellar and on and near the ledge I found Pupas, Vallonias, Succineas, Patulas and Zonites. Under some bricks near a building on my own place I have for several seasons found *Vertigo pygmaea* Drap. but the find in land shells which I value most is *Vallonia costata*, which I found under rocks near our old seawall. These I have found in quantities since the tenth of November, finding some as late as the 27th of December. I believe this is the first time *Vallonia costata* has been found in Maine.

The report of the year's effort and pleasure in the conchological line would not be complete if I did not mention our trip to Old Orchard Beach and Saco, Maine, one day last October. After reaching the beach it took us but a short time to realize that our find would be small that day, and, after three hours gleaning, we had a dozen or two *Siliqua costata*, one *Astarte coustonae*, three *Periploma cochlodensma* and a few other common shells; so, after eating our lunch and giving a few parting glances to the beach, we decided to take the electric car for Saco, and call on the Rev. Henry W. Winkley, whose interesting articles we have read in THE NAUTILUS. We had never met the gentleman, but our faith in the kind-heartedness of all true lovers of Nature gave us confidence, and surely this confidence was not misplaced. Mr. Winkley welcomed us most cordially and inviting us into his library gave us the exquisite pleasure of closely examining the finest collecting of New England shells we had ever seen. Mr. Winkley has been dredging for several seasons and the many rare deep water shells in his

cabinet testify to his success. We gazed with admiration upon the many rare and beautiful shells we had many times read about, but never seen, and were allowed the pleasure—not granted except to members of the guild, I suspect,—of actually handling these specimens.

After carefully examining the New England marine shells we were shown a fine collection of land shells, gathered from every country and every clime, and their various colors, forms and markings were of the deepest interest to us. But all things come to an end all too soon, we had to bid our good friend adieu and hurry to the railroad station (we were to return home by the steam cars). As we reluctantly took our departure from Mr. Winkley's home, where the latch string always hangs out invitingly to every conchologist, we felt that better than the grand collection of shells we had just seen, was the simple, generous, kindly spirit which Nature inspires in all her true disciples.

NOTES AND NEWS.

A SECTION OF CONCHOLOGY has recently been formed in connection with the Michigan Academy of Sciences, the following gentlemen being members: W. H. Sherzer, Ypsilanti; A. H. Boies, Hudson; C. A. Whittemore, R. J. Kirkland, M. D., W. Miller, Charles Miller, Jr., and L. H. Streng, Grand Rapids; F. E. Wood, Bay City; L. T. Schurrer, M. D., Lakeport; C. D. McLouth, Muskegon; Chas. A. Davis, Alma; Jerome Trombly, Petersburg; John M. Miller, Escanaba; Bryant Walker, Detroit.

The formal organization will not take place until the next regular meeting of the Academy, but an interesting programme of work has been planned, which will doubtless lead to substantial additions to the knowledge of Michigan conchology.

PRESERVATION OF MARINE MOLLUSCA.—Those who were interested in Mr. Hornell's paper on formalin (Nat. Sci., vol. VII, p. 416), may like to learn that this fluid has been tried for the preservation of *Aplysia* and *Pleurobranchus*. In both cases, however, a considerable amount of coloring matter was dissolved out of the integument. Dr. J. D. F. Gilchrist, who contributes this observation to Professor Herdman's report, also records a method of killing *Aplysia* in an expanded condition, which he says is the only one that can be

depended upon with certainty. "A few drops of a 5 per cent. solution of cocaine were mixed with the water in which the *Aplysias* were. After a time they expanded fully. They were then left in the solution (twelve hours or more) till no contraction took place when removed and put into weak alcohol. If contraction took place, they would be put back into the cocaine solution when they again expanded. This was repeated till no contraction took place, when they could, after a time, be put into stronger alcohol."—*Natural Science*, March, 1896.

NEW PUBLICATIONS RECEIVED.

A LIST OF THE SPECIES OF AMPHIDROMUS ALBERS, WITH CRITICAL NOTES AND DESCRIPTIONS OF SOME HITHIETO UNDESCRIBED SPECIES AND VARIETIES. By Hugh Fulton (Ann. Mag. Nat. Hist., January, 1896). The species of this difficult genus of Bulimi are arranged according to their affinities in groups; the synonymy is thoroughly overhauled, and several new forms are described. Mr. Fulton has done good service in reducing to varietal rank a large number of nominal species, which have caused collectors endless pains and confusion; his treatment of the *perversus* group being especially commendable. Three excellent lithographic plates illustrate new or previously unfigured species and varieties.

RECOLTE DES MOLLUSQUES; CONSEILS AUX VOYAGEURS, par A. Bavay. Instructions for collecting mollusks, land, fresh-water and marine, with quite full information on where to find them.

CATALOGUE OF THE SPECIES OF CORBICULIDE IN THE COLLECTION OF TEMPLE PRIME NOW FORMING PART OF THE COLLECTION OF THE MUSEUM OF COMPARATIVE ZOOLOGY AT CAMBRIDGE, MASS.—By Temple Prime, 1895.—The species are arranged geographically and under each species are arranged by letters, the synonymy and the various localities represented. Of the genus *Corbicula* there are 58 species; *Batissa* 8; *Velvita* 3; *Cyrena* 42 recent, and 23 fossil; *Sphaerium* 23 recent and 2 fossil; *Limosina* 10; *Pisidium* 31 recent and 2 fossil.

BULLETIN OF THE CHICAGO ACADEMY OF SCIENCES, Vol. II, No. 11, 1895.—Preliminary Outline of a New Classification of the Family Muricidae, by F. C. Baker.

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